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New York State Waterways Association

The Saint Lawrence ship canal proposition

[New York]

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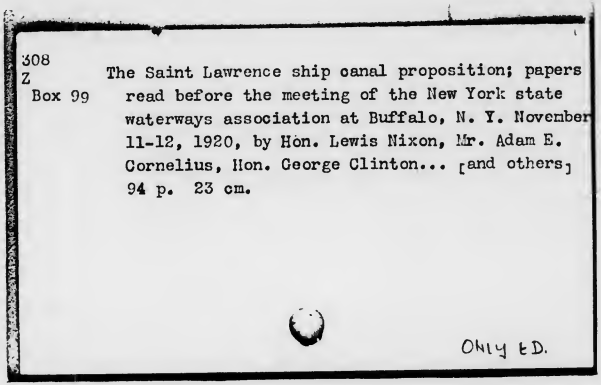
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THE

Saint Lawrence Ship Canal Proposition

PAPERS READ BEFORE THE MEETING OF
THE NEW YORK STATE WATERWAYS
ASSOCIATION AT BUFFALO, N. Y.
NOVEMBER 11-12, 1920

BY

Hon. LEWIS NIXON
Mr. ADAM E. CORNELIUS
Hon. GEORGE CLINTON
Mr. FRANK S. GARDNER
Mr. E. PLATT STRATTON
Hon. MERTON E. LEWIS

The Saint Lawrence Ship Canal Proposition

Paper by HON. LEWIS NIXON.

Mr. Nixon is a builder of ships whose fame is national. He has held the position of Superintendent of Public Works of the State of New York and member of the Public Service Commission of that State, for the First District.

Mr. President and Gentlemen:—

The work laid out for the International Joint Commission is to investigate "what further improvement is necessary" and to submit recommendations for cooperation by the United States with the Dominion of Canada in the improvement of the St. Lawrence River.

Of course, if it were left to investigate the desirability of recommending an improvement it might simply result in waste of money without harmful effect.

So the determination is not to be whether such development is feasible, practical and desirable but the benefits of the improvement are assumed under the adroit and committing wording of the Lenroot amendment, which reads:

> That the International Joint Commission, created by treaty between the United States and Great Britain, relating to boundary waters between the United States and Can-

ada, signed at Washington, January eleventh, nineteen hundred and nine, under the provisions of article nine of such treaty, is requested what further improvements of the St. Lawrence River, between Montreal and Lake Ontario, is necessary to make the same navigable for ocean-going vessels, together with the cost thereof, and report to the Government of the Dominion of Canada and to the Congress of the United States, with its recommendation for cooperation by the United States in the improvement of said river.

It is to be assumed that the State of New York and the other Atlantic States have no desire to present a selfish opposition on the ground that if the proposed route proved desirable and would benefit the United States as a whole, it might injure such sections.

Such selfish and narrow-minded opposition would have to be based upon the admission that such a St. Lawrence River course would divert commerce from the complaining localities. Naturally such diversion would not follow unless the new route provided cheaper or better transportation which would benefit the nation at large.

Our contention is that a ship canal from the Great Lakes to Montreal will not be a success commercially and that money spent upon it would be wasted, so far as the United States is concerned.

Only those with little knowledge of water carriage advocate the navigation of rivers and canals by ocean-going ships, except for short cuts.

Yet the dilettante in water transportation are giving vent to opinions that, while they are useless, may mislead, owing to the high standing of some of the authors.

Great ships built for the open sea or the Lakes must proceed cautiously and with very great reduction of speed in shallow waters. In this case we may assume a speed of five miles an hour to be the maximum.

Cargo vessels on the Great Lakes run about ten miles an hour. So in the canalized river, between the Lakes and Montreal, a vessel would take twice the time that she would require to cover a like distance in the free deep waters of the open sea or lake.

From Chicago to Port Colborne (the western terminus of the Welland Canal) is 880 miles; from Duluth it is 980 miles, and from Port Arthur it is 850 miles.

As it is 390 miles from Port Colborne to Montreal, a vessel could make the trip from Chicago, Port Arthur or Duluth to Buffalo in about the same time she could go from Port Colborne to Montreal.

While we might effect some gain in going through the deeper waters of Lake Ontario, we must add to our estimated time the very great delay met in locks.

The lift will be about 572 feet from sea level to Lake Erie and numerous locks will be necessary. If these be planned for Lake vessels more will be needed than for ocean vessels.

We must figure on an aggregate delay of two days, as the average delay at each lock will be about one and a half hours, even though the actual time of locking will be much less.

Let us look into the economic side of lake vessel operation. These vessels must make their earnings in seven months. It follows that they must make as many trips as possible.

We may safely place the cost of navigating such vessels at $500 per day and we need only look into the use of the proposed Montreal route to be convinced that when using it vessels must charge such high rates that cargoes will be driven to a cheaper route, if such cheaper route exists. And such cheaper route does exist by the way of the Lakes and the Erie Canal.

We can bring 250,000 bushels of grain from Duluth to Buffalo, with return cargo of coal, in about 8 days. Assuming the lake freight at the high figure of four cents a bushel, the down trip would pay $10,000 and the $4,000 for the coal would pay the expenses back.

But if the same vessel went to Montreal the trip would cost about $4,500 for the nine days required. There would be no coal to bring back, so that in coming back, saving a day in the run, she would spend another $4,000.

And, please note, that instead of making twenty trips she would only make ten. So unless she could receive twice the rate per bushel she could not engage in the service. While if she charged twice as much the owner would forfeit the business.

Of course, vessels cannot always secure grain cargoes, and if rates run lower than has been assumed the comparison is more strikingly in favor of the Buffalo route.

We need not go into the carriage of ore, as the ore goes to furnaces on the Lakes.

Even in normal after-war conditions a vessel will not be able to carry grain from Duluth to Montreal for less than 7 cents a bushel.

Now let us trace the grain movement from Duluth to New York City by the Erie Canal. Under pre-war conditions Lake vessels carried, with profit, grain for one and a half cents a bushel from Duluth to Buffalo. Assuming elevator charges at Buffalo at one cent per bushel, the cost of delivering grain from Buffalo to New York would be two and one-half cents per bushel. A good profit can be made on the difference.

But we must look to normal after-war conditions, and when Government control of traffic ceases and we can take a fleet of a steamer and three 18,000 bushel consorts, surely no one will contend that we shall not improve on the old 250-ton mule-drawn boats. But, personally, it is my belief that, as the merits of this route are better understood, larger vessels will bring further economies. Why waste time in discussing the likelihood of ocean-going vessels using the Montreal to Lake route?

Such vessels cost more to run or to rest than Lake vessels, and the losses of time in restricted channels as compared with the open sea would make serious cuts in earnings. The sea-going vessel must earn money on a much greater first cost and the long-drawn-out voyages over soundings and the greater crews all work against the probability of employment.

On the Great Lakes, instead of carrying cargoes on 25 feet draught, they would load far lighter,

such partial cargoes being forced by the depths of connecting channels and ports.

Next we may hear of some fool rushing in and advocating the dredging of the approaches and harbors of the Great Lakes. To one who has followed the gradual development of harbors and approaches to their present wonderful efficiency, and the fitting of the perfect Lake carrier to its work, such ideas can only be met with impatience. Yet a man who knows nothing of ships or harbors will often determine such questions.

Surely, though, no one will advance the idea that the Lake vessel will go on down the St. Lawrence to the open sea. He would simply stand committed as one whose opinion is valueless.

The insurance rates by the St. Lawrence route to the sea are far higher than from New York, due to the danger of the river route with its accompanying fogs, ice and excessive tidal currents.

The earlier closing of the season, even apart from the saving in cost and time by the Erie Canal, argues against the proposed route from an economical standpoint.

Do not let us lose sight of the fact that the various reports relating to the advantages of internal canals have called attention to their strategic advantages.

So let us note that the proposed route would enable another nation to bring war vessels of large size into the interior of our country and menace with their guns the numerous great cities of the Lakes, besides bringing transports with troops and so further hostile operations against us.

The bulletin of the Bureau of Foreign and Domestic Commerce, issued in 1918, most admirably covers the question:

> Before recommending the construction of a new canal at a high cost, assurance must be given that the direct and indirect benefits to be derived are commensurate with the outlay required. It must also be demonstrated that the existing facilities are insufficient and cannot be made sufficient at a cost lower than for the proposed ship canal.

While the above refers to an entirely different project, the logic of the presentation admirably fits in with the sophistry which advocates the St. Lawrence route. This route fails in such tests as above suggested. While the uninformed can indulge in visions of great ocean-going steamships meandering through tortuous and comparatively shallow streams, the practical operator knows that no jack-of-all-trades steamer can possibly be profitable.

The cost even of the necessary surveys on the suggested St. Lawrence route would run into immense sums, as guess-work on a scheme of such magnitude could not be permitted, even in a preliminary survey.

The State of New York has, by the expenditure made and making, nearing two hundred millions, created an adequate waterway from the Lakes to the Hudson, free to the use of craft of all the states, which can take care of an enormous tonnage.

In the event that the development of traffic overtaxes possible terminal facilities at Buffalo and New York, we have the potential domestic routes through Oswego and Albany, by the improvement of Oswego harbor and the deepening of the Hudson to 27 feet to the Federal dam at Troy.

The development of these two auxiliary ports would provide against any possible future incapacity of existing and proposed facilities, and such projects would be based not only upon the economical advantages to be secured in convenience, speed, cost and safety, but would retain to this nation the benefits of handling its own commerce.

We need the money that would be wasted in a commercial sense on this out-of-our-country route for many pressing domestic projects directly in the interest of this country. I can recall no instance in history where one nation has diverted commerce to another to its own disadvantage.

Why, too, with the possibility of healthy merchant marine rehabilitaton and profitable use, must we go out of our way to try to throw cargo to foreign ports when it can be more economically delivered for shipment in our own ports?

Our minds should turn to the problem of broad utilization of canal facilities so generously supplied by the State which expects its citizens to justify such expenditure.

We who have kept the faith in canal enlargement feel that as a better understanding of its advantages to shippers brings into service vessels best suited to its possibilities and their use on a large scale permits such co-operation that the entire floating plant is continually occupied in

gainful transportation, we shall then be able to keep apace with needed shipping facilities and the doubting Thomases will run to cover.

While sure that the United States Government will not be misled into throwing away the people's money on an indefensible project, we must not turn away from the fact that such proposals are hurtful in checking the early utilization of the canal system of this State, with attendant advantages to the nation at large.

For years a ceaseless war was waged against the improvement of the canals, every obstacle being brought into play that capital could command or obstructionist devise.

But in spite of propaganda the canals are coming into use. The State of New York has provided the waterways, has built terminals and is building others, along with grain elevators to handle traffic with the greatest economy and despatch, unsubjected to throttling by adverse interest. By law the railroads must connect with the canal terminals.

Those who wish to engage in transportation on the canal on a large scale must have confidence in its future, and the people of the State generally are fully warranted in sharing such confidence.

The people of the State of New York must not permit themselves to be persuaded that the new Barge Canal, as it exists, is not the best solution of the problem of maintaining an efficient link between lake steamers and ocean steamers. Each of the two types to be operated under conditions that make for the greatest economy in cargo carrying in the service that it is best fitted to fill and each

yielding in turn to the other carrier as superior returns are secured thereby. We thus obtain the maximum economy of service as lake steamer, canal barge and ocean steamer are used, each in its respective sphere of greatest usefulness.

Freight will seek New York City, because from there it passes best to the world's markets. And please remember that, with the Panama Canal in use, New York City is the best stepping-stone to Pacific as well as to Atlantic trade.

The Barge Canal was planned to take care of freight seeking this ideal port of shipment by practical men, who, weighing every consideration, have produced the best possible connection between our Great Lakes Empire and the markets of the world.

Proposals like the canalizing of the St. Lawrence, advanced by those who cannot sense the difficulties, lack of economy and failure of such a plan, simply block for a time the utilization of our canal system by discouraging investments in fleets to ply on waterways where profits are assured and where participation by the citizens of this State is a patriotic duty in the development of the direct and indirect benefits sure to follow its full and effective use.

While, of course, not wishing to charge that this movement is in any way related to the campaign against the use of the State's canals to a degree commensurate with their possibilities, it must be recognized that it discourages the very enterprise which is now in course of healthy development.

After we have overcome the handicap of sixteen years of building and are looking hopefully to

having the Government take its hand off our throat, that private enterprise may do its part, shall we permit the bugaboo of a different route through a foreign country to still further retard the triumphant utilization to the full of canal and lake carriage?

While wishing that all ventures of our sister country to the north minister to its welfare, we can see no objection, except strategic ones to be reported on by our War and Navy Departments, to the carrying out of this work by the Dominion of Canada at that Government's own risk and expense, but at the same time it is to be hoped that every effort will be exerted to induce Congress to refuse to authorize any expenditures by this Government.

The existing trade routes to seaboard, both rail and water, properly utilized by rolling and floating equipment, can keep pace with our needs.

If it does develop that the East and West rail and water routes to the seaboard are beginning to be overtaxed, then the funds of the nation can better be expended on the Mississippi Valley routes to the Gulf ports and canal connections between our Middle West rivers and the Lakes to supplement the East and West highways, thus retaining to this country the handling of its commerce within its own borders.

My earnest belief is that this Association, which numbers in its membership those who have labored for years to secure the great boon of a water highway through our State adequate to the needs of commerce, may not weary in well-doing and that it will not rest till all that was hoped for by it is accomplished.

Paper by MR. ADAM E. CORNELIUS.

Mr. Cornelius is a member of the firm of Boland and Cornelius of Buffalo, N. Y., who are large owners of modern lake vessels. They have been engaged in transportation on the Lakes for years, and are interested in ocean transportation.

Mr. President and Gentlemen—

I have been asked to appear before the Eleventh Annual Convention of the New York State Waterways Association, and I notice on the program that my subject is to be "The Impracticability of the St. Lawrence Ship Canal Project" and I shall endeavor to give you my views from the standpoint of a steamship operator.

First of all, I consider it would seem unreasonable that the United States Government should commit itself to participate with the Canadian Government in such a tremendous and expensive task as the development of the St. Lawrence River channel for ocean going vessels because of the small amount of freight that might be interested in such a route.

During the war when transportation facilities both by water and by land were taxed to their utmost, the Great Lakes boasted of the fact that over 100,000,000 tons of freight was transported over its waters in one season of eight months. It is true this is a tremendous amount of freight, and one writer has aptly put it that this volume of business, if placed in gondola cars, would extend from pole to pole and six hundred miles beyond, and it is quite natural for the outside world to imagine a big part of this freight might be interested in seeking an outlet to the sea; however, of this 100,000,000 tons of freight, approximately 60,000,000 tons consisted of Iron Ore shipped from such ports as Duluth, Ashland, Marquette and Escanaba to Lake Erie ports for consumption by steel furnaces in the Lake Erie district, and approximately 30,000,000 tons additional consisted of coal mined in the anthracite and bituminous coal fields adjacent to the Great Lakes, and shipped West and Northwest. These two commodities totaling approximately ninety out of the hundred million tons of freight shipped on the Great Lakes are not at all concerned about cheaper transportation to the ocean, as they never see tidewater, therefore, so far as this 90,000,000 tons, or nine-tenths of the total freight of the Great Lakes is concerned, the St. Lawrence River project would be but a fifth wheel to the wagon. There now remains for consideration about 10,000,000 tons of freight consisting of grain, flour, lumber, pig iron, etc. The largest moving commodity of those enumerated is grain. While it is true that some of this grain is shipped down the Lakes from ports like Chicago or Duluth for export, it is also true that the United States, with its big density of population East of Buffalo, which is constantly on the increase, and whose crop in the West will probably diminish as the fertility of the soil disappears, now retains a big part of the grain that comes East by the Lakes for its home consumption, and this percentage of home consumption is gradually becoming larger, leaving an infinite decimal amount of freight, probably less than 5% of the total, that is interested in ocean transporta-

tion. It is predicted by experts that eventually the population of the United States will be sufficient to utilize our entire grain products, and when this time arrives, none of our grain will be interested in ocean transportation.

Second: We are opposed to the participation of the United States Government in the St. Lawrence project because we believe, when completed at a probable cost of Millions of Dollars, it would never have the desired effect, viz: making possible a lower rate on freight than now exists on commodities from the Great Lakes to the Sea.

The cheap transportation of freight on the Great Lakes is made possible primarily through the development of a special class of steel ship adapted for Lake use only, which, when combined with the highly efficient loading and unloading apparatus which now exists on the Lakes, have produced the lowest transportation rates known the world over.

The modern Lake freighter of steel construction is nothing more or less than an immense long steel box having its cabins and living quarters located at the extreme forward end of the ship, and its machinery and additional living quarters at the extreme after end of the ship, leaving one large, unobstructed space containing anywhere from 30 to 38 large openings or hatches from 9′ to 12′ fore and aft and running almost across the width of the ship, thereby adapting such vessels for very quick loading and unloading of cargoes. This ship also is unlike the ocean steamer, in that it is constructed with a flat bottom which enables it to carry its full cargo on the limited drafts of

the Great Lakes Harbors and channels. Because of the existence of this type of ship, we are, for instance, able to transport coal from Buffalo to Duluth, a distance of 1,000 miles, with a modern Lake freighter at a cost of 50c per ton, and for years in the pre-war period, the same commodity has been carried for as low a rate as 30c per ton, but whether it be 50c or 30c per ton, this is a cheaper rate per ton than one must pay for the delivery of the same commodity from one's curbstone to the cellar.

Because of this special construction, which has not had to consider the perils of deep sea navigation, the Great Lakes ship could not be depended upon to load cargoes at Lake ports and carry them across the seas, as they are, primarily, Lake ships and could not obtain ocean classification for insurance protection. The St. Lawrence Ship Canal, with its deeper draft, therefore, cannot count upon the Lake ship as a means of reducing the Great Lakes to Ocean and Foreign Ports rates, to the contrary, the movement of freight from the Great Lakes to ocean ports would have to depend entirely upon the ocean steamers.

In considering the ocean steamers operating on the Great Lakes as a possible feature, I wish to make a few comparisons. The average cost of the modern Great Lakes freighter to its owner is $35 to $40 per deadweight ton carrying capacity. The average cost of the ocean steamer to its owner is from $150 to $200 per deadweight ton carrying capacity; in other words, a ratio of one to three or four. It therefore must be seen that an ocean steamer must expect considerable extra earnings

in order to produce the same dividend on the money invested. The average carrying capacity of the Great Lakes freighter is approximately 8,000 tons. An 8,000 ton Great Lakes steamer, as a unit, will carry its full cargo of 8,000 tons on the present limitations of water as it exists in the harbors and channels of the Great Lakes, viz: 20 to 21 ft., and such a Great Lakes steamer will operate with a crew of 30 men. By comparison, an ocean freighter of 8,000 tons capacity operates with a crew of approximately 50 men, and inasmuch as an 8,000 ton ocean steamer requires from 30 to 35 ft. draft for its complete cargo, it could not possibly engage in the transportation of cargoes from the Great Lakes to the sea without reducing its carrying capacity at least 25%, for, as it can be seen, the ocean steamer could not load any deeper than would be allowed by the draft of water in the Great Lakes harbors and channels, viz: 20 to 21 ft., therefore, in this case, while an 8,000 ton Great Lakes steamer would be loading a cargo of 8,000 tons at a Great Lakes port, an ocean boat of the same carrying capacity would be limited to approximately 6,000 tons capacity. In this connection I might state that during the war, the United States Shipping Board and Emergency Fleet Corporation contracted for the building of a large number of ocean-going steamers to be built in Great Lakes yards. These steamers were limited to what is known as the 3,000 or 3,500 ton type because of the size of the Welland Canal locks. They were approximately 250 to 260 ft. long, by 42 to 43 ft. beam. It has been noted that these ocean boats, built on the Lakes,

while they were known as the 3,000 ton type of ship, could only carry 1,100 tons of freight on the Welland Canal draft of 14½ ft. of water, whereas the Lake type ship of the same dimensions with its flat bottom, carries from 2,000 to 2,200 tons of freight on 14½ ft. of water.

Again, the owner of an 8,000 ton Lake steamer would consider his property amply covered against loss if such steamer were insured for approximately $500,000.00. The premium for such protection for one year, on the basis of the 1920 rates, would be about $15,000 per ship. The ocean steamer, on the other hand, because of its greater cost, by possibly 300%, is paying insurance premiums of probably $45,000 to $50,000 per year.

In considering the ocean steamer, I wish to compare a few rates as they exist at the present time for exclusive ocean transportation, as compared with the rates that I mentioned as existing on the Lakes. As stated before, the freight rate for transportation of coal from Buffalo to Duluth, a distance of 1,000 miles, is, at the present time, 50c per ton, and the transportation of Iron Ore from Duluth to Buffalo, a distance of 1,000 miles, is, at the present time, $1.10 per ton. As against this, the present freight rate on coal from Newport News to Boston, a distance of 550 to 600 miles is $2.50 per ton, and the freight rate by ocean steamer from Newport News to Havana, Cuba, is approximately $6.50 per ton, and it must be remembered that engaged in carrying coal from Newport News to Havana or Boston, the ocean steamer has the benefit of her full draft of water, whereas, if she engaged in the Lake trade, she would have her draft reduced by at least 25%.

I might also say, referring again to ocean-going steamers, that were built on the Lakes during the war, these steamers quite often were loaded with cargoes of grain at ports like Duluth or Chicago for delivery to lower Lake ports, and because of their peculiar construction, with machinery amidship, and limited number of hatches, probably one or two forward, and the same number aft of the amidship houses, and having large, high hatch coamings, and we acted, as agents for a number of these steamers, it was extremely difficult to find elevators that could expeditiously handle them. The ocean type steamer, with this special construction, therefore, does not adapt itself to Lake methods of handling cargoes.

In addition to this, I wish also to state that the ocean steamer, endeavoring to navigate on the Great Lakes would be very much handicapped by virtue of the fact that its Master and Mates, while they might be known as first-class navigators on the ocean, would not be permitted to operate boats on the Great Lakes, where a special pilot's license is required, and inasmuch as the pilots on the Great Lakes are also its masters, continually in charge of their ships, I doubt if there would be found a surplus number of pilots who would be willing to refuse permanent yearly positions operating Great Lakes steamers for the privilege of being available for such occasional time when an ocean steamer appeared on the horizon seeking pilots for day and night shifts in an endeavor to navigate the length of the chain of Lakes. Even if it were possible to obtain these additional pilots (three would be required for each steamer) the

additional expense involved would be so great it would offer another reason why an ocean steamer could not expect to operate on the Lakes on a profitable basis.

We, therefore, conclude that the ocean steamer, because of its greater cost of construction and operation, cannot be depended upon to reduce the rates as they now exist from the Great Lakes to the sea. But waiving all previous arguments, I contend that the supply of ocean steamers on the Great Lakes would be limited by the few import cargoes that such ocean steamers could locate in foreign ports or on the seaboard for delivery in bulk at such ports as Buffalo, Cleveland, Detroit, Chicago or Duluth. Inasmuch as the greatest density of the population of this country is along the Atlantic seaboard, such ports as New York, Boston, Philadelphia and Baltimore will always be the distributing ports for imports, and such being the case, it would be seldom indeed when a steamer of the ocean type could find a full cargo in foreign ports destined for any of the inland cities mentioned above, and, of course, if the majority of the import cargoes are destined for ports like New York, Boston, Philadelphia and Baltimore, it is not reasonable to suppose that such steamers would then proceed light hundreds of miles to the mouth of the St. Lawrence River and then on to the Great Lakes for some return cargo.

If ocean steamers cannot be relied upon to secure import cargoes to the Great Lakes so as to connect with export cargoes of grain or other commodities for foreign ports, and if, again, by reason of their increased cost of construction and

operation they could not hope to reduce the present rates from ports like Duluth or Chicago to the sea, the St. Lawrence River project would be of little use to the United States.

I feel, that so far as American freight is concerned, the present water route by way of the Erie Canal to the Hudson River and thence to New York, is the only means by which we can expect a reduction of freight rates on grain and other commodities from the Great Lakes ports to foreign ports. The American route has now been in operation for something like 100 years and the building and maintenance of this route has been entirely at the expense of the State of New York. In the past few years, New York State, alive to the interests of the day, has modernized this canal at an additional cost of approximately $160,000,000.00, so that, at the present time we have a waterway of approximately 12 ft. draft from Buffalo to the Hudson River, and a far deeper waterway from there to tidewater, which, when its terminal facilities have been fully perfected at various cities along its route, and when it is amply supplied with larger barges of increased carrying capacity, and railway connections at various cities along the canal established, should, in co-operation with the Lake Steamers, offer the lowest possible rate that will ever be secured.

For all these reasons, I do not believe it would be practical for the United States Government to participate with the Canadian Government in the development of the St. Lawrence River channel.

Paper by HON. GEORGE CLINTON (Revised).

Mr. Clinton was a member of the International Waterways Commission and has made a study of water transportation from the west to the Atlantic.

Mr. President and Gentlemen:—

Statement of Facts

In addressing you I shall not go into details respecting the effect of a ship canal from Lake Erie to the ocean by way of the St. Lawrence, upon the commerce of the Great Lakes now passing by rail and canal to the Atlantic seaboard. That subject will be fully covered in an address by Mr. Cornelius, who is and has been for some years engaged in carrying on lake commerce. Nor shall I go into detail as to the effect of such a canal in changing the routes of ocean vessels to the St. Lawrence and the Great Lakes from their present courses to our Atlantic seaboard ports; Mr. Lewis Nixon will cover that subject thoroughly. I shall confine myself to the general aspects of the project and say something about the vastly overdrawn advantages to be derived from canalization, by the creation of electric energy.

At the 3rd Session of the 65th Congress, a resolution was passed, in substance referring to the International Joint Commission for investigation, the question as to what further improvement of the St. Lawrence River between Montreal and Lake Ontario is necessary to make the same navigable for ocean-going vessels, together with the cost. The Commission is required to report to the Dominion of Canada and to the Congress of

the United States, with recommendations for co-operation by those governments in the improvement of the River. It is to be noted that this resolution is worded in view of the fact that the Welland Canal is to be improved by increasing the depth to twenty-five (25) feet, with thirty (30) feet over the miter-sills of the locks, which are to be eight hundred (800) feet in length and eighty (80) ft. in width, thus making the canal adaptable for the passage of our largest lake vessels. The prism is to be so constructed that it can be deepened readily to thirty (30) feet. This, with the proposed improvement of the St. Lawrence River canals, would enable lake vessels to reach Montreal and the ocean from Duluth or Chicago, and, vice versa, from Montreal or the ocean to the heads of the Great Lakes. The resolution introduced by Mr. Lenroot was amended by extending the field of investigation of the Commission to routes for a ship canal within American territory.

Ship Canal Benefit to Buffalo if Successful

Were I assured that the proposed ship canal could be used to advantage I most certainly would not oppose it, for the reason that Buffalo and western New York would gain a tremendous advantage, so far as the export of industrial and manufactured products are concerned, and I am certain that the iron, lumber and grain trade of the Lakes would still most largely come to this port, that the grain trade of New York City would not be seriously affected, and that the shipment of manufactured products would remain the same as today, with all the advantages of the port. Buf-

falo is peculiarly well located for manufacturing industries, having a position which enables us to procure raw material and fuel cheaply, with means of distribution to eastern domestic and to foreign markets superior to those of any of the other Great Lake ports, except perhaps Cleveland. Were the St. Lawrence Ship Canal to be constructed, and were it a success commercially, Buffalo would have the advantage for shipment to foreign countries over every other Lake port, except Cleveland, for the distance to the ocean would be much shorter than that from any of the upper lake cities. As to the grain trade I can conceive of no great change in the routes east that it now follows by rail and water, for the reason that the great bulk of our grain is destined for domestic consumption, and less than five per cent. of our total grain crops normally, is exported. I may add that with the increasing growth of population in this country during the coming years, the export of food products, including grain, will decrease to the vanishing point. It is for this reason that I say the grain trade on the Lakes and the Erie Canal and that passing through the State of New York by rail, will not be seriously affected, even should the St. Lawrence Canal be constructed and should it be a commercial success.

General Aspects of the Question.

In approaching the discussion I would premise that it presents several aspects. The great questions which are to be considered in determining the propriety of undertaking the construction of any such channel are of two classes, national and

international. Also the subject has a sectional aspect, that is, to what extent the construction of a ship canal would affect, advantageously and disadvantageously, different sections of the United States, and this involves both the national and international character of the channel. Again, this vital question is presented, assuming that the advantages and disadvantages to different portions of the United States would warrant entering upon the enterprise: "Would the cost of construction and maintenance be so large, when compared with the advantages, as to make the building of the canal advisable?" This involves the subsidiary question whether such a canal would be used to any great extent by either lake or ocean going vessels.

Discussion of these questions must necessarily be from two points of view, first, the assumption that such a ship canal is feasible and would be commercially a success, and second, that such a canal would not be, on the other hand, feasible, and that it would not be a commercial success.

Effect of Canal, if Successful.

So far as the United States alone is concerned, a ship canal from the Great Lakes to the Ocean, if we assume that it would be used to an extent that would make it a commercial success, would be of great advantage for the shipment of the grain, ore, lumber and to some extent of manufactured products, from the northwestern and middlewestern states, as the tendency would be to minimize terminal charges and lower freights.

Of course this would not be true if the canal was not a commercial success. On the other hand, if the canal should become an active and successful avenue of transportation, it would work most decidedly to the disadvantage of the states bordering the Mississippi south of Cairo, tend to prevent the great prospective growth of the commerce of the ports of New Orleans, Galveston and other Gulf ports, as well as those of the Atlantic ports, Baltimore, Philadelphia, Newport News and others. This result would inevitably follow, because rail, lake and river transportation of bulk freights and to a less extent of other freights, would be diverted from their present channels to the St. Lawrence route, with Montreal and European ports as terminals. A direct effect would also be to greatly injure the commercial prosperity of the great middle and eastern states, for the same reasons. Under these circumstances, it is a very pertinent question, "Should the United States expend the moneys coming from the sections of the country last named for the purpose of aiding that section comprised in the northwestern and middle western states to the great injury of Atlantic and the other Mississippi Valley states?" The project is wholly in the interest of a section and against the interests of by far the most populous and prosperous part of the United States, exclusive of that section. We cannot preserve a patriotic unity in these United States, if we are to indulge in improvements for the benefit of particular sections, where other sections of our country may be injured. We must be careful to adjust the application of the revenues of the

country to expenditures which, while they will benefit particular sections, will not injure others and will be of general benefit to the entire country. Any other course will directly tend to dissension between the states and should not be tolerated. I may add that it would be gross injustice to enter upon any project which, while benefiting some states, would have to be principally paid for from the pockets of the inhabitants of the other states, which would either derive no benefit or whose prosperity would be actually injured. It would therefore seem that the question I have propounded should be positively and firmly answered in the negative.

International Benefits.

If the proposed ship canal should prove a commercial success the benefits to the United States would be confined to a few states, with great injury to the South Atlantic, Gulf and in some degree to the Pacific states. Indeed, it may be said that the United States would be more injured than benefited. So far as Canada and Great Britain are concerned, there would be considerable gain by reason of direct transportation from the grain fields of the Canadian Northwest. If the traffic was involved in through transportation Montreal would be greatly injured. I may say that if the traffic from the Lakes stopped at Montreal and cargoes were there transferred, the benefit of eliminating terminal charges would not exist. Later I shall speak of the benefits to be derived from generation of electricity.

Canal Not Successful Commercially.

So far I have discussed the proposition under consideration upon the assumption, for the purpose of the discussion, that a ship canal from the Great Lakes to the Ocean would be a commercial success. This assumption will not bear investigation in the light of practical experience, the difficulties and expense of the undertaking and well known economic rules which govern transportation. Indeed, the construction of such a ship canal would be so great a failure commercially that it would not warrant the expenditure of anything like the amount that it would cost.

Connection of the Great Lakes with the Ocean has been the dream of many men in this country. It is still a dream, for the day of dreamers has not passed. As early as 1708, the connecting of Lake Erie with Lake Ontario, as a first step towards reaching the upper Lakes directly from the St. Lawrence and by that River reaching the Ocean, was suggested by Cadillac. The project was rejected by the Minister of Louis XIV as impracticable on account of its expense. That canal would have been the ship canal of those days, accommodating bateaux, carrying about five tons. The idea of overcoming the Falls and Rapids of the Niagara by a canal was the subject of suggestion and agitation from time to time for many years. The principal result was the construction of the Erie Canal from the Hudson to Lake Erie, but the minds of some men still clung to the idea of utilizing the waters of Lake Ontario by a ship canal around the Falls and Rapids of the Niagara. The result was that in 1853 a charter for the con-

struction of a ship canal around Niagara Falls was granted by the State of New York to Dean Richmond and others. A survey was made pursuant to the charter, the routes covered being practically the same as those suggested by the Deep Waterways Board of Engineers of the United States, as printed in its report of June 30, 1900. That canal would have been a ship canal for that day as it would have accomodated vessels of five hundred tons. The undertaking was, however, abandoned. The final outcome of all the suggestions, schemes and undertakings for connection between the Great Lakes and the Ocean by canal culminated in the rejection of all plans on the grounds of impracticability, lack of promise of commercial success and great cost, and the solution of water communication with the Ocean was found in the construction and subsequent improvement of the Erie Canal from the Hudson to Lake Erie, with a connection by way of Oswego between the Hudson and Lake Ontario, on the American side of the boundary, and on the Canadian side by the construction of the Welland and St. Lawrence River canals. Nevertheless the dreamers still had visions of a continuous ship waterway and, although it had been determined that the cheapest means of transportation was by lake vessels to Buffalo and by barge from Buffalo to tide-water, a board of Federal engineers was appointed to again investigate the subject of a ship canal. This Board made a report in 1897, which was very incomplete, the principal recommendation being that thorough investigation, surveys and estimates of costs should be made. Ac-

cordingly, another Board of Engineers was appointed by the Government to undertake the work and it made a report in 1900. It proposed two or three different routes from the Niagara River, around the Falls and Rapids, to Lake Ontario and two principal routes from Lake Ontario to the Hudson, one by the way of Oswego and one down the St. Lawrence to Lake St. Francis and thence across Canada and the United States to Lake Champlain and the Hudson River. The expense was estimated at $90,000,000 for the cheapest route, exclusive of administration. It is well to notice that one of the routes from Lake Ontario east suggested by the Board was wholly in American territory, but that the other was in Canadian waters and Canadian territory from St. Regis on the St. Lawrence to where the line struck the boundary of New York near Lake Champlain. This report has never been acted upon. The fact is that the idea of constructing a ship canal has been abandoned until renewed lately. It is also to be noted that the expense of construction estimated by the Board was arrived at from the cost of materials and labor obtaining at the end of the last century, and that after adding at least ten per cent. to the estimate for contingencies, the cost of administration and the increased cost of labor and materials, the expense would be today, at least $400,000,000 for the cheapest route recommended. That at least ten per cent, should be added to all engineers' estimates for such undertaking is proved not only by the cost of construction of the Panama Canal, but by the construction of the Barge Canals of the State of New York.

The original estimate for the Barge Canals was nearly $50,000,000, but more careful investigation increased this amount to $90,000,000, and subsequent rises in labor and material caused further additions, bringing up the estimate to $100,500,000, to which, to cover contingencies, $500,000 was added, making the amount $101,000,000. Contingencies in administration and construction arose so that in the end the Barge Canals cost $123,000,000. The Cayuga and Seneca Canals have cost $7,000,000, but this was not included in the original Barge Canals improvement.

When Mr. Roosevelt was Governor of the State of New York he appointed a committee, March 8, 1899, to investigate the questions connected with the improvement of the state canals, and the project of a ship canal. The Commission consisted of men eminently competent to investigate. They were the late Francis V. Greene, chairman, Edward A. Bond, State Engineer and Surveyor, John N. Partridge, Superintendent of Public Works, Major Thomas W. Symons, U. S. Engineers, and Messrs. George E. Green, John N. Scatcherd and Frank S. Witherbee. This Committee made a thorough study of the subject personally, held meetings to obtain information and solicited and received communications from many prominent engineers and from individuals acquainted with the canals of the State and with transportation by canal, lake and river. January 15, 1900, the Committee made a report in which their decision was against abandoning the canals, against a ship canal and in favor of the improvement of the State canals to barge capacity. The report is illuminating. Upon the subject of a ship canal the commissioners said "There are certain insuperable difficulties in the way of such a canal ever being a success, no matter by whom constructed. It is intended to be used by vessels which can navigate the ocean, the canal and the lakes. We do not believe that such vessels can be constructed so as to be economically a commercial success. The ocean vessel is built to withstand the fierce storms of the Atlantic and costs in its most modern type about seventy-one dollars per ton of carrying capacity. The vessel that can navigate the lakes is built to withstand less frequent and dangerous storms; it has less draft on account of the smaller depths of the harbors on the lakes and is built much less substantially; its cost is about thirty-six dollars per ton of carrying capacity. The cost of a canal fleet, consisting of a steamer and three consorts, with a total capacity of 3,900 tons, according to figures furnished us by boat builders, will be $28,500 or $7.31 per ton." The commissioners then call attention to the fact that the barge canal type is by far the most economical for investment. They then refer to the average speed on the Suez Canal, six miles per hour, the canal having a total length of ninety miles, of which fully two-thirds is a large lake, and say that in a private waterway ocean steamers or lake steamers could not attain a speed exceeding five miles an hour and that while ocean vessels are built to run from fifteen to twenty miles an hour if their speed was reduced to five miles an hour for a long distance the then existing rates on the ocean and lake of about half a mill per ton mile would have to be very largely increased.

The solution of water transportation from the Great Lakes to the Sea was therefore found, pursuant to previous investigations as to the cheapest method of transportation, in utilizing the Lakes and the construction of a canal that would float barges that will carry over a thousand tons and fleets of barges that will carry the full cargo of a lake vessel.

Canada a few years ago took up the question of securing the lake trade for Montreal by the construction of a canal, known as the Georgian Bay Canal, from the head of Georgian Bay by the way of French River, a series of small lakes and the Ottawa River, to that City. A large amount of money was spent by the Canadian Government in investigating this plan; extensive and minute surveys and plans with estimates of cost were made. The result was investigation of the feasibility of constructing a ship canal connecting the head of Georgian Bay with Montreal, having twenty-five miles of artificial canals, eighty miles of dredging and three hundred and thirty two miles of waters improved by the construction of dams, making the total distance to Montreal from Duluth 1,056 miles, whereas by the Great Lakes and the New York barge canal the distance is 1,480 miles to the ocean at New York, a saving of 424 miles. The expense was found to vary in accordance with the difference of cost between two of the entrances into the St. Lawrence at and near Montreal, but the variance was comparatively small and the estimated cost of the entire work was about $100,000,000. There were no great difficulties in this work and the saving in distance was great, never-

theless it was found the exigencies of navigation would cause in the end so great a loss of time in transportation, and the commercial and economic objections were so great that the construction of the canal has not been deemed warranted.

An alternative to the Georgian Bay Canal is the improvement of the Welland Canal so as to enable the largest lake vessels to proceed to and down Lake Ontario to Kingston for the transhipment of cargoes to barges that would pass the St. Lawrence canals which have a depth of fourteen feet over the miter-sills. This was determined by the Canadian Government to be the most feasible and cheapest route to Montreal. Accordingly, improvement of the Welland Canal has been undertaken, and although it has been delayed by the great war, it will be completed. The Welland canal will be twenty-five feet deep, with the walls of the locks so constructed that it can be readily deepened to thirty feet. It will have thirty feet depth of water over the miter-sills of the locks, which will be eight hundred feet long and eighty feet wide in the clear. The depths of water are figured for extreme low water. The width of the canal will be two hundred feet at the bottom. Thus we find that the Canadian Government has abandoned the idea of a ship canal to Montreal and has adopted the principle simply of utilizing the waters of Lake Ontario for lake vessels, by the improvement of the Welland canal, and the use of barges on the St. Lawrence River and the St. Lawrence River canals.

Thus history shows that the idea of a ship canal all the way from Lake Erie to tide-water is a

dream which is dissipated when resort is had to a careful investigation of the commercial element of cost of transportation. I may add that this conclusion has been come to after most thorough investigation, surveys and estimates and in view of the cost of transshipment from large vessels to barges. There are other elements which enter into the problem which I shall discuss hereafter.

The result of the history of this movement is that further investigation of the feasibility and advisability of a ship canal from the Great Lakes to the Ocean is not necessary, and that such a canal, involving, as it would, a waste of money, should not be constructed.

Available Routes.

An element necessary to consideration of undertaking the project is the availability of routes. I say the "availability of routes" because previous surveys have pointed out what routes for topographical and economic reasons could best be adopted. One of these is the wholly Canadian route by an improved Welland Canal, Lake Ontario and the improvement to ship size of the Canadian canals. The other routes are those described in the report of the Deep Waterways Board of Engineers. Starting from the Niagara River a ship canal would be constructed around the Falls on the American side. This would now seem to be unnecessary as the Welland canal is to be improved. Lake Ontario would then be utilized as far as Oswego and from Oswego a ship canal would be constructed up the Oswego River,

connecting with Oneida Lake, which would be deepened, thence using the Mohawk route to the Hudson. As an alternative, the route would proceed down Lake Ontario and the St. Lawrence to Lake St. Francis, and from near the foot of that Lake across Canadian territory to the boundary line of New York State near Lake Champlain, and thence to the head of Lake Champlain and on down to the Hudson. It will be observed that the line of the first mentioned route would be in Canadian territory to Lake Ontario, if the Welland Canal should be used, and in American territory if a new canal around the Falls was constructed on the American side. If the Oswego route should be adopted it would be thence within American territory through and from Lake Ontario. If the Champlain route should be adopted it would be in Canadian territory from St. Regis until the boundary line of New York near Lake Champlain was reached. Thus, on the Champlain route for about one hundred miles navigation would be in and under the control of Canada, except the comparatively short distance around the Falls if a ship canal to Lake Ontario should be constructed on the American side. The cost of these routes, undoubtedly, today, would be over four hundred millions of dollars, more, when land purchase and damages are added.

The question suggests itself here whether the advantages of such a ship canal on either of these routes or on the St. Lawrence would outweigh the disadvantages. It is quite certain that no patriotic American would consent to place the control of navigation between the Ocean and the

Great Lakes in the hands of Great Britain and Canada, either wholly or partially. If the St. Lawrence route is adopted that control is within their power. If the Champlain route is adopted it is within their power from a point near the head of Lake Champlain and it would be comparatively easy for Canada to complete ship navigation by canal from the foot of Lake Francis to Montreal, which is but a few miles, and thus obtain absolute control of the commerce of the ship canal to the Lakes as against the Champlain-Hudson route from the head of Lake Champlain.

Disadvantages

There are serious objections to the use of the St. Lawrence River from Montreal to the Ocean for navigation by ocean or lake vessels. These objections have been considered time and again and they have the most serious handicap to the growth of Montreal as a great seaport. We all know that Montreal does not compare with New York as a commercial port, and we all know that it has no prospect of ever successfully competing with New York. The reasons are the violent cross-currents in the Gulf of St. Lawrence and the heavy fogs and ice which not only make navigation extremely dangerous, but which actually raise insurance rates to a point that tells heavily against the commerce between Montreal and foreign countries and has told heavily against it in the past. The risks on the lower St. Lawrence are so great that some insurance companies will not cover them. Insurance from Montreal to Great Britain from the opening of navigation to Oct. 15, averages 27½ cents per hundred, from that date to October 31, 32½ cents, from Nov. 1 to Nov. 15, 42½ cents, from No. 15 to Nov. 25, 55 cents, when insurance ceases until the opening of navigation in the spring. From New York to Great Britain the average rate is 1-8%, which is 12½ cents per hundred, all the year around.

United States Report on Improvement up to Canadian Border

Investigation of the conditions of the Great Lakes has been made by the War Department in connection with a proposed improvement by the United States of the St. Lawrence River from Lake Ontario to the Canadian border, with a view to providing navigation facilities suitable for ocean-going ships. In 1917 the Rivers and Harbors Act directed a preliminary examination of Lake Ontario and the St. Lawrence River, with a view to the improvement stated. The examination was made in 1918 by Col. J. B. Warren of the Corps of Engineers, and his report, dated April 4, 1918, was thoroughly considered by the Board of Engineers, approved by them and submitted to the Chief of Engineers, whose approval of the report, with all documents and communications, were submitted to the Secretary of War, who transmitted them to the House of Representatives December 16, 1918, as appears from Document No. 1591 of the 3rd Session, 65th Congress. The report and the approvals all declare that the improvement of the St. Lawrence from Lake Ontario to the Canadian Border, with a view to providing navigation facilities suitable for ocean-going ships, is not deemed advisable at the present time. Col. War-

ren and the Board of Engineers considered various projects and give cogent reasons for not recommending the improvement, and among other things they state that even with a ship channel from the international boundary line on the St. Lawrence to the ocean by the Champlain-Hudson River route, or by the enlargement of the Soulanges, Lachine and other canals on the St. Lawrence route, the traffic would still be governed by the depths of the harbors and connecting waters of the Great Lakes, and they refer to House Document No. 755, 65th Congress, 2nd Session, for data on this subject. As appears from that document, the deepening of the harbors and connecting waters of the Great Lakes to twenty-five feet, even, was reported upon unfavorably on the ground that traffic existing and prospective would not warrant the expenditure. It is to be noted here that deepening the harbors and connecting waters of the Great Lakes to twenty-five feet would not be sufficient to permit ocean vessels of capacity compared to that of our lake vessels to navigate the lakes and enter the lake harbors and that our lake vessels are not adapted to ocean navigation. We thus have the opinion of the Board of Engineers and the Chief of Engineers that the deepening of the harbors and connecting waters of the Great Lakes and the construction of a ship canal to the international boundary is not warranted by the present or prospective commercial conditions, even though the ship canal should be continued to the Ocean. The conclusions of these officials were arrived at only after the most careful consideration of cost, hydraulic, topographic, and engineering elements, as well as commercial conditions.

Economic Navigation by Lake Vessels Impossible.

There is another aspect of the economic question involved which is wholly one of navigation. Great Lake vessels are practically hollow boxes, constructed for the purpose of carrying the largest cargoes possible on the lowest draft of water on inland lakes and connecting waters, construction being adapted to the comparative safety of inland navigation and the shortness of the season, which averages seven months. Lake vessels must carry as large cargoes and make as many trips as possible, on the Great Lakes to earn the largest profits. They average a speed of twelve miles an hour on the open waters and nine miles on the connecting waters, and they can make, at an average of ten miles an hour, the trip from Duluth to Buffalo in about four days and from Chicago to Buffalo in about three and one half days. In the narrow channel of a ship canal, with the delay of lockage, these boats could not make safely more than about four miles an hour. An illustration of the possible speed is to be found by taking five trips of Government vessels from Lake Erie ports to Montreal. From figures furnished by the Emergency Fleet Corporation it appears that the average speed in the Welland Canal and in the St. Lawrence River and Canadian canals was 2 76-100 miles per hour. This speed would be increased slightly if the River were canalized, as there would be a less number of locks and the channels could be made wide and deep enough to permit vessels to make probably four miles an hour. The delay

at locks may be illustrated by the use of those at Sault Ste. Marie. The average delay is an hour and a half. In the past, before the construction of the third and fourth locks, within my personal experience, vessels have been delayed fourteen hours. If the traffic on the ship canal is at all great, the average delay at each lock would certainly be an hour and a half, and as there would be at least thirty locks to overcome the difference of the levels of Lake Erie and the St. Lawrence at Montreal (573′ to 18′ above tide-water) nearly two days would be wasted in passage one way, nearly four days on the down and return trip. This calculation is on the basis of the system of canals and lockages around the rapids of the St. Lawrence and the reduction of the number of locks by the new Welland. The total number of locks might be reduced to about twenty with a loss of time to vessels of a day and a half, on the average, for each trip. If the St. Lawrence is canalized the expense will be tremendous, but the locks can be reduced in number to thirteen, not including the seven locks of the New Welland, on the route from Lake Erie to Montreal. If such vessels navigated a ship canal to Montreal, the loss of time between Lake Erie and Montreal would involve so great a loss of earnings that the trade would not even attract our lake vessels, unless freights were raised to a point that would far exceed the cost of transfer at Buffalo and carriage by the Erie Barge Canal and the Hudson River to New York. If such vessels undertook to pass Montreal and proceed, we will say to Liverpool, they would be at the mercy of the fogs and cross currents of the Gulf of St.

Lawrence and the storms of the Atlantic, which they are not fit to encounter, and their comparatively low power would not make them successful competitors of ocean vessels carrying from the Atlantic ports of our country. In addition to this, the higher rates of insurance of vessels and cargoes on the lower St. Lawrence would add a burden that would be almost destructive of transportation by lake vessels from the Lakes to Europe. If our lake vessels delivered their cargoes at Montreal they would suffer a further loss, inasmuch as from that port they could not get the return cargoes which they now do from Lake Erie ports, and they would have to take partial cargoes, if any, through the ship canals and Lake Ontario, a distance from the foot of Lake Erie of 369 miles. The expense of these vessels is about $500 a day and they must make as quick trips as possible with as large cargoes as can be had, both up and down the Lakes, and they cannot spend time going to Montreal or encountering the dangers of the ocean in competition with ocean vessels.

It is interesting to recall that this experiment of navigation to Montreal by Lake vessels via the Welland and St. Lawrence canals has been tried in the past but abandoned as too expensive. Lake vessels delivered at Kingston where transshipment was made to barges. Even this method of reaching tide-water was more costly than transportation by Lake vessels to Buffalo or Oswego and thence by the New York Canal system, and therefore the Canadian route took and now takes but a small percentage of the Great Lakes traffic.

Use of Route During War No Test.

The use of the St. Lawrence route during the late war furnishes no test of commercial success. There was no use of the route by large commercial lake vessels, cost of transportation was not considered and investigation will show that it was too excessive to warrant use by lake vessels for commercial purposes.

Economical Use by Ocean Vessels Impossible.

We may now consider ocean vessels from the point of view of utilizing the waters of the St. Lawrence River to the harbors on the Great Lakes. A typical ocean carrier, with a tonnage of ten thousand, is comparable to our largest lake vessel. It has a draft of over twenty-seven feet and a cargo capacity of about three hundred and fifty thousand bushels of wheat; its speed is about twelve miles an hour. The ruling freight on grain, New York to Liverpool, is today seventy to eighty cents per hundred pounds, or between forty and fifty cents a bushel. The owners of such vessels would most certainly not engage in traffic between Montreal and the harbors of the Great Lakes for the reason that their ocean rates are so far above lake rates that they could not compete with lake carriers on the lakes without a great reduction of their own rates. It would be much more to their advantage to deliver at Atlantic ports in the United States and much more to the advantage of shippers to ship to such ports even by rail, certainly by the Great Lakes, the Barge Canal and Hudson River to New York. Ocean vessels (as well as

lake vessels) could not navigate a ship canal even thirty feet deep with any safety, without limiting their speed to as low as four miles an hour, in view of the danger of grounding, danger of sheering and danger of collision with the banks and in view of delays at the locks. In addition, ocean vessels require a greater number of skilled officers and a much larger crew than Lake vessels, and their expenses are excessive; they cannot afford to navigate long, narrow channels and shallow waters.

It is impossible to imagine an ocean vessel undertaking the trip by way of the Gulf of St. Lawrence, the River St. Lawrence, Lake Ontario and the Welland canal in order to reach the Great Lakes. It is absurd to think of such vessels navigating the many miles of ship canal by the Mohawk and Oswego route or the Hudson-Champlain route, in order to reach the St. Lawrence or Lake Ontario, and thence proceeding across Lake Ontario and through a ship canal around the Falls. Ocean vessels will not engage in the business of the Great Lakes because they cannot do so without sacrificing earnings and incurring unnecessary dangers of navigation in narrow and inland waters; they certainly cannot engage in commerce on the Great Lakes unless the connecting waters and the harbors are deepened to at least thirty feet, something which is not to be expected since the proposition to deepen to twenty-five feet has been rejected by the War Department and the Board of Engineers as not warranted by any present or prospective condition of commerce.

The result at which we arrive is that the commerce from Lake Erie to the ocean via any of the

ship canal routes, would not reach an amount that would have any appreciable effect upon the continuance of the present methods of doing business upon the Great Lakes. It follows that the expenditure of hundreds of millions of dollars in the construction of a ship canal would practically be a waste of money.

Cost.

The cost of a ship canal is a most important element to be considered. The cost of the canal in comparison with its utility must eventually determine the feasibility of the project.

No authentic estimate of the cost of straightening, widening and deepening the channels and of constructing dams and locks has ever been made. This is because no study of the question by competent engineers, based on thorough surveys and plans, has at any time been authorized or undertaken. We have, therefore, proceeded only upon the basis of physical conditions, prior partial surveys and estimates of private individuals based on more or less accurate investigations. Proceeding on this basis we find, first, that according to the estimates of a private corporation formed in Canada to construct a ship canal and develop electricity, the expense is estimated at $500,000,000.

Next we know that while canalization should be accomplished by the erection of dams at the foot of the different rapids, the expense would be many millions of dollars for construction and the dams would flood extensive territory on the American and Canadian sides that would cause great damage

on both shores, and consequently very great expense for the payment of land and other damages. This condition of affairs was thoroughly investigated before the International Waterways Commission, which held several hearings on the propriety of damming the Long Sault rapids for power purposes. The improvement proposed would have backed up the waters of the St. Lawrence, my recollection is, about nine miles, but this was modified so as not to destroy the Cornwall canal, and the flooding was restricted, but the flooding from ice jams caused by the dam still remains a powerful objection to permitting its erection. Canada would not consent to the scheme and it was abandoned. The dam was to be erected for power purposes, but it also was to improve navigation and was to have a lock. If the River is to be canalized so that ocean vessels can navigate it above Montreal, the depth of the channel, and consequently the height of the dam at the Sault, would have to be very considerably greater than the one proposed by the Power Company.

The channels must be at least thirty feet deep if ocean going vessels navigating them are to proceed in safety and with reasonable speed. The width at the narrowest parts should not be less than the width of the artificial channel through Lake St. Peter below Montreal, namely, 450 feet in straight portions and 600 to 750 feet at bends. To this must be added the cost of locks and dams and of improving our lake harbors and their approaches. An estimate of $500,000,000 for this work is certainly within the limits and would not include the improvement of the lake harbors.

This assumption is based upon generalization arrived at from estimates for a ship canal made by the Deep Waterways Commission and by those made by the private corporation which has proposed to canalize the St. Lawrence, as well as upon general knowledge of the cost of work of this character. It is to be noted that at the Sault Ste. Marie the Poe Lock could probably be adapted, at a very large expense however, to allow the passage of vessels drawing twenty-five to twenty-seven feet, but if the canalization were successful and ocean vessels were going to and from Lake Superior, all the locks would have to be deepened except the Weitzel. It is well to note here that the present locks at Sault Ste. Marie, on the American side, originally cost about $12,000,000; that on the Canadian side I have not the figures for but it probably cost in the neighborhood of $3,000,000. In considering the cost of canalizing the River we have very little data for calculation, but it is certain that the cost of dams and locks (probably thirteen dams and twenty locks) would reach close to a hundred million dollars. In addition to this the channel of the River would have to be straightened at various points and there would be a tremendous amount of rock excavation and also a great deal of other material would have to be removed. From the head of the River to Ogdensburg there is a fair channel, in many places quite narrow, but with a depth of water which is insufficient for the width needed by ocean-going vessels. Below Ogdensburg the channels are tortuous, narrow and of insufficient depth for large vessels down to the Galop rapids, which are now

overcome by canal. At the Galop rapids a dam might possibly be put in which would give a depth of thirty feet, but this is problematical, as flooding of the neighboring territory on both sides would have to be considered. At present there are two channels here, one navigable by light draft boats only, the other being unnavigable. From the foot of the Galops for eight miles there is a single, tortuous channel with three pools thirty feet or more deep, with narrow channels between and with controlling depths of twenty to twenty-five feet. Thence to Bradford point there are two channels, the American not being navigable except by very small boats; this would need deepening. Thence for seven miles the River is a wide pool. With a depth of thirty to fifty feet, except at one point where it would have to be deepened from about twenty to thirty feet. Just below this the Long Sault rapids begin, which, including rapid current channels below the rapids, extends for eleven and one-half miles down to Massena Point. Here we have two channels, the American, narrow, tortuous, with a swift current throughout being unnavigable. The Massena power plant takes its water about two miles below Richard's Point, near the head of the Sault rapids. The Canadian channel is unnavigable except by special passenger steamers and small craft. From Massena Point to the boundary line the United States channel is of ample width and depth except opposite the mouth of the Raquette River, where the controlling depth is twenty-two feet. About a mile below Grass River is the New York, Ottawa Railroad bridge which has a head room of only thirty

seven and one-half feet above high water, insufficient for ocean going vessels and even for our largest lake vessels running light. Through Lake St. Francis, thirty miles, to the head of the Soulanges canal there is only fourteen feet draft available. That canal overcomes the three rapids, Coteau, Cedars and Cascade, which would have to be eliminated by a dam or dams. From the entrance of the canal into Lake St. Louis there are sixteen miles of navigable river through the Lake, with ample depth except in spots, where excavation would be necessary. The Lachine rapids would have to be overcome by a dam. The great bulk of the excavation necessary above St. Regis would be through rock. All the work would have to be done in swift water and would be extremely costly, but what that cost would figure up could not possibly be ascertained until the channels had been located and the excavation computed from accurate surveys and soundings. In Lake Ontario there is ample depth but the approaches to the Welland Canal would have to be deepened and the improved canal would also have to be deepened to thirty feet. The depth in Lake Erie would be sufficient until the mouth of the Detroit River is approached. There for miles the dredged channels would have to be deepened about nine feet and the Livingstone, Limekiln and other channels in the lower part of the River would have to be given a like depth. Through Lake St. Clair the channels and the canals at the foot of the River St. Clair would also have to be deepened about nine feet. The River St. Clair is a deep river, but in the upper and lower parts and at other places deepening

would be necessary, in most instances five to nine feet. The same is true to some extent of the entrance to St. Mary's River. The channels of the St. Mary's River would require deepening almost the entire way, including the East Neebish and West Neebish channels, Mud Lake, the Little Rapids Cut and the channel thence to the foot of the locks, as well as the canals and channels above the locks, until deep water is reached in Lake Superior. A rough estimate of $500,000,000 for the construction of the dams and locks, for excavation. for temporary improvement of the Poe lock and final improvement of all the other locks and payment of land purchase and damages, is undoubtedly too small.

In addition to this the United States would have to deepen all harbors of refuge and at least twenty-four important and many small harbors and their approaches to thirty feet, at an expense to it of probably $100,000,000 more. Beyond this, either the canal across Keweenaw Point would have to be greatly enlarged and deepened at tremendous expense, or the channels around the head of Isle Royale would have to be improved so as to be made safe and sufficient for vessels drawing at least twenty-seven feet and requiring a depth of thirty feet. When those who advocate making lake ports ocean ports by the scheme proposed, attempt to figure the expense, they undertake to do so upon the basis of data whereof they know not.

Cost Against Advantages

The remaining question is whether a ship canal would be warranted by the advantages as against

the cost and its commercial utility. Study of this question makes it quite apparent that the expenditure of money would be largely wasted if a canal upon any of the routes was constructed, and it is certain that the commercial advantages would not be at all commensurate with the expenditure. Consideration of these propositions involves a study of the water conditions on the Great Lakes, economical transportation on the Great Lakes and economical transportation on the ocean, as well as the objections to the St. Lawrence route.

Electric Power Development.

It has been held forth, as a sort of sop, to the middle and eastern states which would be injured commercially if a St. Lawrence ship canal should be constructed and prove a success commercially, that a tremendous electric power could be developed. This is a matter of importance which must be considered by the Joint International Commission and by us, because if a tremendous amount of electric power can be generated at the navigation dams to be constructed which will offset to any considerable degree the expense of the United States and Canada of constructing the canal an element is presented which is of great importance in determining the questions involved. But before considering physical conditions and the amount of power which can be developed it becomes necessary to inquire into the final ownership of that power, for if the Government of the United States will not get the benefit, the cost of making the River navigable will have to be met by the taxpayers regardless of benefit or injury. This involves a short consideration of legal questions; not that the Commission is called upon to determine these questions, but with a view to exercising their judgment as to who will be entitled to the power created.

In the first place it is settled that the Federal Government of the United States cannot erect structures for the purpose of generating electric power except, of course, upon its own properties. But serious questions have arisen which remain undecided. These are: Does the United States acquire the right to use, sell or lease water power created by the erection of dams which are in good faith constructed for the improvement of navigation? Second, if the Federal Government does not, by the erection of navigation dams, acquire exclusive right to the water power, who does?

In endeavoring to meet these questions I cannot enter into a legal argument in this paper and must confine myself, therefore, to a statement of general principles. This being so, I would respectfully refer all who are interested for full discussion of the subject to a clear and common sense argument presented in the book issued by the Yale University Press, entitled "Conservation of Water by Storage", the book being a compilation of Yale lectures delivered by George Fillmore Swain, L. L. D. I would also refer to "Limitations of Federal Control of Water Powers" by Rome G. Brown. These two sources of information seem to furnish sound opinions and complete references to all the law on the subject. The paper of Merton E. Lewis, late Attorney General of the State of New York, read before the Joint Inter-

national Commission at a recent hearing in New York City, is also of great value. Certain principles of law are well settled.

1. There is no ownership of moving navigable waters, nothing but the right to use.

2. Riparian owners have a vested right to the use of waters passing their premises for navigation and power purposes, they may erect dykes, dams, piers or wharves, so long as they do not interfere with the navigation rights of the public or trespass upon lands under water owned by a state, the general government or other individuals.

3. Where a state is the owner of lands under water it can utilize those lands for power or navigation purposes so long as it does not destroy the vested rights of riparian owners or interfere with navigation.

4. The right to navigate navigable waters is vested in the public and each state holds in trust the control and regulation of that right. This trust is inalienable and is subject only to the paramount power of the Federal Government to regulate the use of public navigable waters of the United States and to improve lakes, rivers and harbors that come within that description, for navigation purposes.

5. Under the Commerce Clause of the Constitution of the United States Congress has power to improve public navigable waters of the United States (including water supply from tributaries), and it may do this by the construction of dams, not being liable to private owners for damages un-

less uplands are taken or their value destroyed or injured.

6. The general government may, for the purpose of improving navigation, permit individuals or corporations to erect dams upon navigable streams.

7. Rights of riparian owners cannot be divested arbitrarily under the plea of improving navigation.

8. The exercise of power under the Commerce Clause of the Constitution is limited by the sovereign power of the different states and by ownership in states of lands under water, and it cannot be extended beyond the exercise of the power of regulating commerce by improvement of navigable streams of the United States for navigation purposes solely.

9. Whether, in case the United States constructs a dam to improve the navigation of a stream, it acquires the right to all the water power created without reference to the rights of the state within which the stream is or to the rights of riparian owners has not been definitely decided by the Supreme Court of the United States. The general impression is that the creation of the power vests the general government with the absolute and exclusive right to that power, but this is by no means conceded and is in serious doubt. The best opinion, based on common law rights of the states and of riparian owners, would seem to lead to the conclusion that the state or the riparian owner, as the case might be, remains the owner of

the right to use the water, and that where that right is interfered with by the construction of a dam, it must be preserved, in the case of a state, by leaving the power at the dam under the control of the state, or if the state does not own the lands under water, the riparian owner whose ability to utilize the passing water for power purposes has been destroyed, must be either compensated or given the benefit of the power created to the extent that he would have been able to utilize the power of the stream had no dam been erected.

10. That the general government has the power to utilize individuals or corporations by authorizing them to erect dams for the improvement of navigation undoubtedly exists, but whether the power created can be conveyed by the government to those who erect dams for the purposes stated is very much in doubt. This power has been exercised, but has not, to my knowledge been directly passed upon by our highest courts. It is, however, a question of little moment in considering the advisabilty of canalizing the St. Lawrence River.

A Short Description of the St. Lawrence River.

From Lake Ontario to the Gulf of St. Lawrence below Quebec let us say to Point des Monts, is about five hundred miles; from Three Rivers, practically the head of tide-water, to the Lake is about 258 miles. The River for the possible generation of electricity, may be divided into two sections, so far as international interests are concerned, namely, from Lake Ontario to the foot of

the Long Sault Rapids and from there to Montreal. Below Montreal the St. Lawrence presents no feasible opportunity for the impounding of its waters in order to gain head.

Considering that part of the River from Lake Ontario to the boundary line at St. Regis, just below the foot of the Long Sault Rapids, we find these conditions: From the head of the River to Ogdensburg is sixty-two miles and the fall of the River is only one foot, so that no opportunity for the generation of electricity is presented in that stretch. From Ogdensburg to St. Regis is 54 miles and in this stretch there is a fall at the rapids of 78½ feet, divided as follows: At the Galop Rapids there is a fall of 15½ ft.; below the Galop Rapids is the Rapide Plat or Morrisburg canal section having a total lift of 11½ feet; the last canal or what is called the Wiliamsburg group is at Farran Point, which has a lift of 3½ feet. These canals, therefore, represent the fall of the River from Ogdensburg to the swift waters at the head of the Long Sault Rapids, divided into three sets of rapids the upper having a fall of 15½ feet, the middle 11½ feet and the lower 3½ feet. It is apparent that at the foot of these rapids, taken separately, no great amount of horsepower could be developed. We then come to the Long Sault Rapids, the last on the international boundary. These rapids are overcome by the Cornwall canal, on the Canadian side. The fall of the Long Sault rapids is represented by the lift of this canal which is 48 feet. At the foot of these rapids we find the first point in the River where any great amount of horsepower can be generated. Later I will give

the amount available. A short distance below the foot of these rapids we reach the end of the boundary line between Canada and the United States, and from there on the River is wholly within Canadian territory and the water power is wholly Canadian. The Canadian water power available may be utilized at the foot of what is known as the Soulanges canal and near the foot of the Lachine canal. The lift of the Soulanges canal is 84 feet and it overcomes the Couteau, Cedars and Cascade rapids. Whether it is practical to utilize the entire 84 feet by a dam at the foot of the Cascade rapids, or not, is questionable, but if we assume that it is, an enormous horsepower can be developed. If it is not, there will be a very considerable loss of power as against the 84 foot development. I shall assume that an 84 foot development is practical, in giving the total horsepower hereafter.

The lift at the foot of the Lachine rapids is 45 feet and here a valuable plant can be located which will develop great power.

Montreal is at the foot of the Lachine rapids and is at the head of ocean navigation on the St. Lawrence. Below Montreal there is a dredged channel as far as Fathers Point, with a depth of thirty feet and a width of 450 feet in the straight portion and 600 to 750 feet in the bends, and from there to Quebec there is a wide and deep channel and below Quebec the channel is deep and has a width of at least 1,000 feet to the Gulf.

From Point des Monts (considered as the head of the Gulf) to the ocean is about 500 miles, with wide waters and deep channels, but beset with

cross currents and fogs and the channel itself is not straight and has many rocks and shoals in it; in winter, navigation in the lower part of the Gulf is hindered and rendered dangerous by floating ice.

At the last meeting of the Rivers and Harbors Congress Mr. Vogelsang, then acting Secretary of the Interior, delivered an address for the purpose of showing that a tremendous amount of electric power could be generated at navigation dams on the St. Lawrence which would be a tremendous benefit to the eastern and middle states and would save an enormous quantity of coal. His paper exhibits a generous disregard of all that is practical, as he proceeds upon the basis of the general slope of the River without regard to expense of construction or practicability or advisability of erecting dams for navigation purposes and without any knowledge as to how the power would be divided. He also disregards all the elements, in utilizing the power, of the cost of transmission, loss of power in transmission and the tremendous cost of transmission lines. He also, in an easy manner, assumes that a tremendous amount of coal would be saved to the United States by the creation of a tremendous amount of electric power, when the fact is that hardly a pound of coal would be saved except, perhaps, temporarily, for the electric power would be utilized in a multitude of ways and would be accompanied by an increase of use of power that would utterly prevent its having any effect upon the use of coal for steam.

The amount of power which could be generated and its use, and the cost and the cost of transmis-

sion and utilization can only be determined by accurate surveys, plans, determination of market and ownership of water power at the dam. Prior expert investigation and planning must precede the making of figures that will be entitled to authenticity or accuracy. Nevertheless, some idea of the power which can be generated may be arrived at by consideration of physical conditions of the River. In doing this we must assume that the Government is to erect dams for the purpose of securing a depth and width of channel sufficient for navigation of the St. Lawrence from Lake Ontario to the sea by vessels capable of economically making ocean voyages, and we must keep in mind that the general government cannot indulge in constructing dams that will accomplish this purpose at the tremendous increase of expense over what is necessary for navigation purposes, in order to use the entire river slope between Lake Ontario and Montreal. It follows that the dams must be simply sufficient to overcome the rapids and create pools above them that will, with excavation, give the necessary depth and width of channel for navigation by such vessels. Applying this rule we find that the fall at the Galops rapids is 15 5-10 feet and that the water power which can there be developed is 423,605 7-10 horsepower, that the Rapide Plat 314,288.1 horsepower can be developed and at Farran's Point 95,652 horsepower. At the Long Sault rapids 1,311,811 2-10 horsepower can be generated, making a total of 2,145,357 9-10 horsepower from Lake Ontario to the foot of Long Sault rapids, this being the water horsepower which can be developed on the

boundary line between Canada and the United States and all other power available will be wholly within the Dominion of Canada. This calculation of power at the wheel is on the basis af a mean discharge of 241,000 c. f. s., but should be on the basis of the low water discharge and should not be calculated on a greater flow than 210,000 c. f. s. as a mean water standard. Adopting the formulae of the Federal Power Commission the efficiency of the power at the wheel would be seventy per cent. and the delivery of power to generators would therefore be 1,513,480 horsepower. Assuming an efficiency of the generating apparatus of ninety per cent., the electric energy delivered to the switchboard would be 1,362,132 horsepower. Of this the United States would be entitled to one-half, namely, 681,066 horsepower.

In passing it is well to remark that the utilization of the entire horsepower at the Sault rapids would either destroy the horsepower of the Massena Company, which uses about 30,000 c.f.s. (taken from the River near the head of the Long Sault rapids) or the vested rights of that Company would have to be condemned to make available at the dam the entire power. In either event the expense would be extremely heavy.

Below the foot of the Long Sault the water power belongs to and beyond doubt will be retained by Canada, as I have said, but for the information of those interested it may be well to give a short statement of what can be developed:

	Head	Discharge	Horsepower
At the foot of the Soulanges ...	84	241,000 c.f.s.	2,295,669
At the foot of the Lachine	45	241,000 cf.s.	1,229,823
Total at the wheel			3,525,492

Electric horsepower at the switchboard (70% efficiency of water power developed and 90% efficiency of generators) 2,221,060.

Division of Benefits and Cost.

It can be stated with reasonable certainty that the cost of constructing the ship canal, with dams and plants adapted to the generation of electric energy, improving the Lake channels and reconstructing the Sault locks, would be at least $500,000,000 of which the United States would have to pay one-half, namely, $250,000,000. In addition to this, the United States would have to improve the lake harbors to correspond with a ship channel depth of thirty feet, and while the expense of this cannot be at present accurately estimated, it would not be less than $100,000,000, if we may judge by past harbor improvement cost and present prices for labor and materials. The entire cost to the United States would therefore be at least $350,000,000. The State of New York would pay about 40% of the total cost to the United States, namely, $140,000,000, for which it would get 681,066 electric horsepower and no benefit from the practically useless ship canal. The other states could not possibly get any benefit from the

ship canal and economically could not get electric power, would pay at least 50%, or $175,000,000, and the states which imagine they would be benefited by the canal, but which could get no electric power, would pay not over 10% or $35,000,000.

It is interesting to note that of the total expense (if it did not exceed $500,000,000) Canada by paying one-half, $250,000,000, would get one-half of the electric power above the boundary line at St. Regis, namely, 681,066 electric horsepower and in addition, would get the entire power developed east of that point, namely, 2,221,060 horsepower, and would obtain the advantage, in commerce, of the improvement of our lake harbors, of the expense of which the United States would pay one-half, except that of improving the lake harbors, of the cost of which it would pay all, and the State of New York would pay forty per cent, of the burden on the United States.

The State of New York Generous

It has been charged that opposition by the State of New York to making lake ports ocean ports is entirely selfish. From what has been said it is quite apparent that this is not so, for the commerce of the western part of the State would be benefited if the St. Lawrence route were successful, and the eastern parts, including the City of New York would not be materially injured. Our State has always been generous to the Northwest in the expenditure of moneys to facilitate transportation. In the early days it constructed the Erie Canal at a cost of about nine million dollars

and thus hastened by many years the growth of the very states that are charging selfishness, giving a tremendous start in the direction of populating their wilderness, increasing that population and starting the Northwest on the road to the great prosperity it has attained. Subsequently, as the railroads attempted to dominate transportation, the State improved the Erie Canal as a curb upon discrimination and the levying of inordinate freight rates, thus most materially helping the agricultural, manufacturing and mining interests of the states who say we oppose their selfish scheme from selfishness on our part. Again, as railroad facilities, cheapening their transportation and handling of freight increased until water transportation was threatened with practically extinction, except on the Great Lakes, the State of New York expended over one hundred million dollars in improving the Erie Canal to a capacity that would enable it to carry in the cheapest way possible the products of the West coming to it by rail or lake. All this has been done by the people of the State of New York, they paying for the great benefits that have been conferred upon the Northwest and without aid from the states advocating the St. Lawrence route and after repeated refusal of the Federal Government to do the work or participate in the expense. We oppose the St. Lawrence scheme solely for the reason that we should not be called upon again to expend at least another hundred million dollars upon what must prove, economically and commercially, a failure to such an extent as to make the undertaking practically an unimportant feature in cheapening

transportation from lake ports to the Atlantic ocean.

Summary.

1. It is entirely certain that the expenditure of an immense amount of money in a new investigation as to the feasibility of construction of a ship canal to the ocean is not necessary and not warranted.

2. No attempt to make lake ports ocean ports could possibly be successful economically or commercially. This is especially true of the proposed St. Lawrence route.

3. If such a ship canal should be a commercial success it would redound to the advantage of a few states and great injury to the southern and southwestern.

4. The amount of electric power which could be generated cannot at present be accurately calculated. It can be said with reasonable certainty, however, that it would not reach three million five hundred thousand electric horsepower at the switchboard. Of this Canada now controls and would never relinquish, at least two-thirds and would be entitled to one-half of the remainder.

5. The idea of transmission to any states other than to the State of New York is chimerical and not based upon any careful estimate of investment, loss of power and cost of transmission.

6. There would be no ultimate saving of coal in the United States by reason of the generation of electricity from the St. Lawrence water power, because all of that power would be utilized, as

well as all the steam power that is now being generated and which will be generated in the future.

7. History, the inviolable principles governing the economies of transportation, investigations which have heretofore been made and all calculations which we are able to make at present from utterly insufficient data show that the cost of the St. Lawrence-Lakes Ship Channel would exceed $500,000,000, and that in addition to this the United States would have to pay in the neighborhood of $100,000,000 more to adapt its harbors and their approaches to navigation by ocean going vessels. It further appears that this expense would not be warranted by any use which would be made of the ship route from the Lakes to the ocean and that the expenditure would be practically wasted.

8. Careful consideration of all the facts should dissipate the dream of a Great Lakes to the ocean ship canal. Ignorance of conditions and dealing in mere generalities have misled our friends of the Northwest.

9. The State of New York has contributed so greatly to creating the prosperity of the states urging the St. Lawrence canalization scheme that its people cannot justly be accused of selfishness. The selfishness is wholly upon the part of those men who are asking for the expenditure of hundreds of millions of dollars for what they conceive to be their own benefit, doing this with full knowledge that the State of New York will have to contribute nearly one-half of the burden which will fall upon the United States, and that they will have to contribute not over one-fifth.

Paper by MR. FRANK S. GARDNER.

Mr. Gardner has held the position of Secretary of the New York Board of Trade and Transportation for many years. His knowledge of water transportation in the United States qualifies him to speak with authority.

NEW YORK BOARD OF TRADE AND TRANSPORTATION
38 Park Row, New York.

October 20th, 1920.

To The International Joint Commission on the Proposed St. Lawrence River Ship Canal.

GENTLEMEN:

The proposition to improve the navigation of the St. Lawrence River is one of the most important and attractive questions now before the American people. It is a question worthy of the most serious and honest consideration by the United States as well as by the Dominion of Canada. The New York Board of Trade and Transportation welcomes its consideration at this time.

The proposed expenditure will be large, but not prohibitive provided the advantages derived should measure up substantially to the hopes and predictions of the proponents.

The Board of Trade and Transportation has considered the proposition in its broadest aspects as it might affect the interests of the two countries directly concerned and the interests of other countries. We have also considered the question of possibility of making the river navigable for ships of large tonnage, and the possibility of such vessels being passed through such improved chan-

nel from and to Lake ports, to and from the ports of the world in foreign commerce.

Our consideration of these questions had led us to the belief that the construction of the proposed works for the improvement of the navigation of the St. Lawrence River would not injuriously affect the commerce of New York, and, having no concern on that score, we are the more able to view it dispassionately; almost disinterestedly; interested in it only as it would affect other sections, and our great country as a whole.

From these circumstances, we are constrained to avow our unselfish interest in the welfare of other sections although such avowal may be regarded by some as insincere, and due to the fact that, in a broad sense, the prosperity of the country as a whole is essential to the prosperity of New York. Long recognizing this fact, New York is not provincial in its conception of the relations it holds to the country, and it has the enviable distinction of being the only essentially national city and port in all of its larger interests, and especially in its commerce.

We are, therefore, jealous of no section, or of the prosperity of any; neither would we deny any of the slightest or of the greatest advantages obtainable by it by reason of its enterprise, initiative or location, nor would we withhold our approval and help in promoting the welfare of other sections.

The foregoing remarks, however they may be regarded by committees and states less favored, indicate the true spirit and attitude of New York.

New York is magnanimous and can afford to be so in all of her relations with the rest of the country and it is in this spirit that New York has approached the consideration of the proposition to improve the St. Lawrence River.

The occasion and seeming necessity for thus emphasizing the magnanimity that characterizes New York, was the attitude of bitter hostility to New York which marked the inception of this proposition and its discussion in the U. S. Senate and House of Representatives and elsewhere, and the assumption, belief and avowed purpose by its proponents that they were, in fact, making a deadly assault upon New York's greatness and supremacy and were about to promote and adopt a measure which would tear down and destroy the great commerce and prestige which she had gained through her unparallelled enterprise, initiative and foresight coupled with the expenditure of vast sums of money in supplementing and improving her God-given natural advantages of location.

In saying that we are opposed to the participation of the United States in the work of improving the navigation of the St. Lawrence River and in sharing in the cost of such work, we deny and resent the charge that we are in the least actuated by selfish motives or by the fear of any impairment of our commerce or of our proud prestige.

We are opposed to that proposition because we confidently believe that, while engineers can undoubtedly overcome and remove the obstacles to navigation in the St. Lawrence River if a sufficient amount of money be provided therefor, the

St. Lawrence River even at the greatest attainable depth, can never be made any shorter, the Lake ports can never be brought any nearer to the deep ocean, the climatic conditions can never be modified, the transportation there can never be made as cheap as existing routes if profitable to the carrier thereon, and, however much its navigability may be improved the advantages this may give will be neutralized by these natural and unchangeable disadvantages and dangers.

To make the route practicable commercially and attractive to shipping and investors therein, the business of transportation thereon must be profitable to the extent at least of realizing a reasonable return upon the investment employed. This seems axiomatic, for capital is devoid of sentiment.

Thus far this proposition and the great propaganda in its behalf has been promoted upon manufactured sentiment where it has not been based upon unwarranted assumptions. The picture has been painted and presented to the imagination of the ambitious and thrifty people of the Great Lakes States showing the advantages of making seaports of the Lake cities, and forgetting or ignoring all else, they have been led to believe that by the skill of the engineer, as by the lamp of Alladin, the wonder will be accomplished.

We can sympathize with these enthusiasts in the sad awakening that awaits them when their millions and ours have been wasted in bed rock removed and sunk in concrete put in place and there are no ships going and coming with cargoes of freight.

The Barge Canal through New York State challenges the St. Lawrence route to mortal combat if by ruinous competition alone the St. Lawrence illusion is to be dispelled.

The capacity of a canal is to be measured by the capacity and facility of its lockages and the continuous employment of such facilities. The Barge Canal of New York is equipped throughout its entire length with range lights and other lights, buoys and markings which make it as practicable for navigation by night as by day, and the practice upon the Erie Canal has always been to move the boats continuously day and night, 24 hours every day, upon their trips through the canal. The Government operated boats are not being so moved, but are run only 8 hours out of the 24 every day and are tied up the other 16 hours. This is a costly and wasteful use of the equipment and privately operated barges, when the canal shall have been again properly equipped with barges, will return to the old system of continuous travel.

The capacity of the Erie Barge Canal has been all too conservatively estimated at ten million tons eastward and a like tonnage westward.

A fleet of four boats upon test has been passed through the new large locks in 10 minutes. We might add 50 per cent to that time and estimate an average time of 15 minutes for each lockage of a fleet of four boats carrying 2,600 tons. But let us be extremely conservative and say that, while upon test the lockage can be made in ten minutes, under average conditions without pressure, we allow three times as long for each lockage, or say

30 minutes for each lockage. That is two lockages each hour, each lockage passing 2,600 tons of freight or 48 lockages in each day of 24 hours. Multiply the 2,600 tons by 48 lockages and you have 124,800 tons of freight as the capacity for each 24 hours. The season of navigation is never less than seven months or say 210 days. In each of the 210 days the Erie Barge Canal can pass through its locks without pressure, 124,800 tons of freight, and in the whole 210 days a total of 26,208,000 tons. This is what the Erie Barge Canal can do when taking life easy. What it could be made to do under pressure we shall not venture to predict. This is the modernized route with which it is assumed, that the St. Lawrence River can compete successfully. This tonnage, if all wheat is equivalent to about 902,267,000 bushels. This is the possible tonnage operating the locks continuously or one half hourly, east and west equally. It is equal to 13,104,000 tons easterly and the same westerly. To carry the same tonnage out via the St. Lawrence River would call for a fleet of 1310 vessels of 10,000 tons freight capacity each. At $300,000 cost per vessel this would require an investment of $393,000,000. Upon this investment a reasonable profit would have to be assured in advance or the investment would not be made.

When the Erie Barge Canal shall have secured its equipment of barges and they shall be operating upon a competitive basis as of old, the normal level of canal rates will be restored and will fall as formerly far below the rail rate. With the Erie Barge Canal in operation it will be made serious-

ly more difficult to induce investment of capital in vessel property to operate upon the St. Lawrence River because to carry any freight at all the St. Lawrence River vessels will have to accept a freight profit considerably lower than the Erie Canal barge to compensate for the higher cost of insurance, the larger amount of interest upon the investment (the ship being much more costly to build that the canal barge) and for the higher aggregate wages of the ship's crew, (the ship requiring a larger number of men for the same tonnage as compared with the canal barge).

In addition to the larger overhead costs upon the 10,000 ton ships as compared with the canal barges of equivalent tonnage, the ship will be compelled to pass the contracted channels of the St. Lawrence Canal and River at a lower rate of speed.

The speed upon the wider waters of the Suez Canal cannot safely exceed 5 to 6 miles per hour. Upon the Manchester Ship Canal with a draft approximately the same as the proposed St. Lawrence Canal the speed is an average of only about 2½ miles per hour.

If the speed upon the St. Lawrence Canal including the time consumed in passing through locks should be as great as even 6 miles per hour, the St. Lawrence vessel in point of cheapness as a carrier would be hopelessly outclassed by the Erie Canal Barge.

Some light may be thrown upon this phase of the problem by known experience upon the Lakes. The Great Lakes ore carriers, upon the pre war

basis, could carry ore at a cost of 50-100 of a mill per ton mile, running at a speed of 13 miles per hour, loading and unloading in the most expeditious manner with specialized facilities and everything going fair.

This ore transportation upon the lakes is perhaps the most highly specialized and cheapest system of inland water transportation in the world and it gives the remarkably low transportation cost of a half a mill per ton mile under these peculiarly favorable conditions.

At the same pre war time, before the Barge Canal was completed, the cost of carrying freight upon the Erie Barge Canal from Buffalo to New York as estimated by the Green investigating committee, covering all costs, was 26 cents per ton or 53-100 of a mill per ton mile. The later improvements in the Barge Canal assure a rate of cost relatively lower than that under normal conditions.

The Lake vessel referred to carrying at 50-100 of a mill upon the Lakes at 13 miles per hour, when passing through the canal at 2½ miles per hour as in the Manchester Canal, or at 6 miles per hour as in the Suez Canal, will take more than twice as long to travel per mile, and as all charges of interest, insurance, labor, etc. run by time the cost will be more than doubled upon the river as compared with the cost upon the lake, and it is manifest that under such circumstances the cost would exceed a full mill per ton per mile which would be about double the cost of carrying upon the Erie Barge Canal. Moreover, not only will

the actual cost of transportation be about double but the insurance rates on the St. Lawrence are greater than upon the Erie Canal and will with other larger costs go to so increase the handicap of the carrier upon the St. Lawrence that if he ventures into the business for a single trip his experience will be so disastrous as to forbid a second venture.

These facts speak for themselves. They need no glossing or padding. They show, as we believe, beyond question that the idea of utilizing the St. Lawrence route for navigation to *reduce* the cost of transportation to the seaboard is a mere dream. Then do we oppose the project and most earnestly protest against the expenditure of several hundred millions of money from the U. S. Treasury only to convince the misguided advocates of this scheme that they are mistaken.

A brief reference at least should be made herein to the fact that canal rates upon the Erie Canal during the present season have been so high as to disappoint our friends in the West who have been anticipating a lower rate from the improved New York Canals.

Several things have operated to discourage capital to invest in the transportation business upon the Erie Barge Canal. When looking for the completion of the improvement in 1917 and the opening of the canal in 1918, many large capitalists were making arrangements to enter the business. Then the United States entered the war and neither labor nor material for boat building were obtainable. Nevertheless a number of these concerns persisted in their efforts to make contracts

for boats without success. Then early in 1918 the Railroad Administration took over all the available boats on the canal, assumed control of navigation, drove the existing canal lines out of business and fixed the canal rates upon a par with rail rates. All interest in boat building at once disappeared.

In October, 1918, a committee from New York appealed to Director McAdoo for encouragement in promoting the building of barges. He said to us in Washington on October 24th, 1918, "If you want so much steel as it would take to make a tenpenny nail, you cannot have it." Of course the case was hopeless.

When in the winter of 1919-1920 the bill was under consideration in Congress for the return of the railroads to their owners and to end the operations of the Railroad Administration, interest revived remarkably and again there were many important barge building schemes projected. But the bill as passed, Transportation Act 1920, contained a provision in Section 201 to the effect that the barge lines owned and operated by the Railroad Administration should pass under the control of the War Department and their operation be continued by it or under its control. Therefore the Federal owned barges have been since and are now operated upon the Erie Canal by the War Department and again all interest in the transportation business by private enterprise has ceased.

A bill introduced by Senator Wadsworth to end Federal operation of barges for commercial purposes on the Erie Canal was passed by the Senate

at the last Session and was pending in the House Committee of which Mr. Esch is the chairman when Congress adjourned last Summer. It is hoped that this bill will pass at the coming session and remove the last existing obstacle and discouragement to the entering of private capital into the business upon the New York Canals.

In the meantime the Government operated boats are making poor headway, operating the boats only 8 hours out of the 24 every day. The few independents have been much in demand and the limitations of railroad transportation making rail carriage slow and uncertain, these boats have been taking freight at rates actually in excess of rail rates, because the boats move along and reach their destination and deliver their freight while the railroad cars are side tracked along the line between Buffalo and New York with no certainty when they will reach destination. These abnormal conditions and the scarcity of boats have made canal rates abnormally high, even higher than rail rates during the present season.

These conditions will be speedily changed and the canal equipped with barges, when the Government interference in transportation upon the canal ceases and conditions become normal. Anticipating this the Legislature of New York at its last session authorized the building of a new grain elevator at New York Harbor to cost $2,500,000 and the work on it has begun.

A grain elevator has also been authorized at Oswego, and steps are being taken to compel the existing elevators at Buffalo to end their discrimination against the canal and to send via canal all

grain that it can carry, and, if the Buffalo elevators do not keep faith in this with the State the State will build at Buffalo a new large State grain elevator or purchase by condemnation some of the existing elevators in order to insure the canal fairer treatment and proper facilities.

Respectfully submitted,

FRANK S. GARDNER,

Secretary.

Paper by MR. E. PLATT STRATTON.

Mr. Stratton is a naval architect of national reputation. He has an intimate acquaintance with navigation on the St. Lawrence and the ocean.

PERILS OF THE LOWER ST. LAWRENCE

E. PLATT STRATTON,
GARDEN CITY

MR. CHAIRMAN:

The attention of the writer has recently been called to the address of Mr. Merrick, President of the Association of the Chamber of Commerce of the City of Chicago, in behalf of and favoring combined action by the United States and the Dominion of Canada for the construction of a Ship Canal down, or along, the St. Lawrence River to the Gulf of that name. Also to a paper published over the name of Charles Whitney Baker, a member of the Society of Mechanical Engineers in which he refers to the scheme of this proposed waterway as follows: "Fourteen states of the northwest have united in a league to promote this project and are doing it officially through their State Governments . . . If this organization continues and the work of promotion, public education and planning the details of the enterprise is carried out with the same energy and ability that would be the case if the project were being furthered by a private enterprise by a powerful financial syndicate then success of the project appears certain." These two gentlemen, I would infer, are neither navigators nor mariners, and are evidently totally unfamiliar with the latitude of the

route to be navigated, or they would doubtless have some hesitancy in expressing an opinion on a subject so greatly affected by the conditions with which they are unfamiliar, i. e., navigation in extreme north latitudes.

In this connection, I submit for your consideration the following pertinent facts. The City of Chicago the principal place of departure in latitude 41 North is, as almost everyone knows, closed to navigation by ice for at least five months of the year, and yet, it is one of the most southerly of all ports on the Great Lakes. The other end of the proposed canal, i. e., the mouth of the St. Lawrence River is 625 statute miles north of Chicago, or in latitude 51 degrees north. Here, in a section of the ocean north of Sable Island and the Banks of Newfoundland, between Cape Race and Sable Island in close proximity to the Strait of Belle Isle, a section known to all deep-water sailors as the "Grave yard of the Atlantic", in which lie the wrecks of the French Line S. S. "Burgoyne", the Cunarder "Titanic" and the White Star liner "Atlantic", with their death toll of hundreds, not to mention the countless wrecks of merchantmen with which this region is strewn, in this section the entire commerce of our great northwest, presumably the fourteen states above mentioned, is to be launched on the North Atlantic: Why, Mr. Chairman, the navigation of this region is regarded by all ship owners and underwriters as the most hazardous of the entire globe, owing to the quantities of ice from the coast of Labrador, much of which is forced thru the Strait of Belle Isle and

involves the Gulf of St. Lawrence in an almost constant menace of snow, ice and fog, to shipping of whatever sort entering or departing from the Gulf and its neighboring waters.

Again, as early as 1891, Mr. Charles Councilman, an American gentleman and capitalist of Chicago, had constructed, fitted and equipped in a most competent and seaworthy manner four modern, ocean-going steel steamships, designed and built expressly for the route and trade between Chicago and the City of Manchester, England. In anticipation of the construction of these four splendid steamers, hope and speculation, just as at the present time, ran high in every lake city from Duluth to Oswego, and presumably thruout the same fourteen states already mentioned, in visions of the entire lake coast becoming a commercial adjunct of the sea-coast, with a foreign trade of quick delivery and short haul, with great seaports of entry from Lake Superior to Lake Ontario. With the opening of navigation in 1891 the first of Mr. Councilman's four ships was loaded and took her departure for Manchester, but, to the astonishment and chagrin of the owner and shippers alike, under rates of marine insurance calculated upon the risks above mentioned both here and in England, which were virtually prohibitive. To make matters worse, several thousand dollars worth of cargo was damaged on this first voyage out. Mr. Councilman, nevertheless, pluckily sent across the other three ships only to find himself forced to withdraw the line as unprofitable owing to the high rates of insurance on both ships and cargoes.

Once more, Mr. Chairman, there is the case of the Allan Line of English ships operated from Montreal under a heavy mail subsidy or contract with the British Government, which every winter has to abandon its regular St. Lawrence route and port of call for some port on the coast further south.

Furthermore, Canadians know well that their southern coast line is too far north for successful canal operation thru the greater part of the year, and this is the reason why they have abandoned all thought of developing the all-Canadian route from Georgian Bay and the Ottawa River to the St. Lawrence, a route which if capable of successful operation would shorten the distance from the head of the Great Lakes to the sea by many miles and give Canada a great advantage on all Lake shipping.

In view of the conditions of navigation above submitted, of the complete failure of the former attempts to overcome the difficulties, of the fact that the Canadian government neglected its own shorter route, it is respectfully submitted that the theories of the two gentlemen above mentioned, together with the visions of great commercial development throuout the fourteen states in proximity to the Great Lakes, as the result of these theories, are based upon misleading and fallacious arguments, resulting from a complete lack of knowledge of conditions as already experienced, and involve the expenditure of millions of dollars in a venture which is fore-doomed as a successful financial enterprise.

Paper by HON. MERTON LEWIS.

Mr. Lewis is a lawyer of high standing and was formerly Attorney-General of the State of New York.

MR. PRESIDENT AND GENTLEMEN:

In the consideration of the question of the improvement of the navigation of the St. Lawrence River, we must not deceive ourselves as to the obstacles which confront us.

Those obstacles are the provisions of the Federal Water Power Act, the decision of the Court of Appeals of this state in the Matter of Long Sault Development Company, 212 N. Y., page 1, and the decisions of the Supreme Court of the United States in Long Sault Development Co. vs. Call, 242 U. S. 272.

Perhaps those obstacles may not be insurmountable, but they seem to me to be, at least, formidable.

The power of the legislature to grant lands under water of navigable streams is not and cannot be questioned, in the light of the decisions of our courts.

Such grants, however, must be reasonable and the use must be a use which can fairly be said to be for the public benefit, or in any event for a use which will not be injurious to the public. This proposition has been sustained by the courts of this state for many years.

The most recent case in which this doctrine has been declared is the Matter of Long Sault Development Company, 212 N. Y., page 1,

In that case Chief Justice Williard Bartlett reiterated the proposition, and the court over which he presided held, with but one dissenting vote, that not even the legislature itself could effectually vest in a corporation which it chartered under special act, the right to construct its power plant and works in such manner as to "preclude the state from ever thereafter improving the navigation" of the St. Lawrence River.

The court also held that the legislature of the state was without the power to "authorize the conveyance of a navigable portion of the St. Lawrence to a private company to maintain and control navigation thereon, thereby parting for all time with its own power to improve such navigation."

In the same opinion Judge Bartlett says:

> "As long as the waters are maintained as navigable they remain public waters of the state; and as long as they remain public waters of the state the state is bound to retain control over them in the public interest."

The court held that the attempt by the legislature to abdicate the state's control of the navigation of the St. Lawrence River vitiated the entire status, for the reason that it was beyond the power of the legislature to alienate the sovereign power of the state; and that it had no greater right to do this than it had to "abdicate its police powers in the administration of government and the preservation of the peace."

The legislative act creating Long Sault Development Co. (Laws of 1907, Chap. 355), contained a provision that the navigation of the St. Lawrence River "shall be preserved in as good condition as, if not better than, the same is at present".

The Act of Congress, known as The Federal Water Power Act, contains language less effective, it would seem.

Subdivision C of Section Nine of that act requires that any licensee "shall so maintain and operate said works as *not to impair navigation.*"

Subdivision B of the same section requires any applicant for a license to construct works for the development of power to submit to the Commission "satisfactory evidence that the applicant has complied with the requirements of the laws of the state or states within which the proposed project is to be located with respect to the bed and banks and to the appropriation, diversion and use of water for power purposes, and with respect to the right to engage in the business of developing, transmitting and distributing power, and in any other business necessary to effect the purposes of a license under this act."

In view of the fact that the Long Sault act was held unconstitutional by the Court of Appeals of this state, and that the United States Supreme Court (242 U. S., 272) denied its jurisdiction to review the Court of Appeals' decision, it may fairly be supposed, (1st) that no license will be issued to an applicant who has failed to comply with the requirements of Subdivision B of Section Nine of

the Federal Water Power Act, and (2nd) that compliance with such provisions by any applicant will be impossible, for the reason that no power exists in the legislature or in any officer, board or commission to grant to an applicant the right to construct such works. This is the holding of the Court of Appeals, and with this holding the Supreme Court of the United States has declined to interfere.

Congress, undoubtedly, possesses the power to improve the navigation of the St. Lawrence River; in so doing it may and probably would create a great and valuable water power. Not even Congress, however, can utilize that power without constructing works for that purpose. Such works cannot be constructed, except upon lands under water which are the property of the state. Such lands can be granted by the state to an individual only under the provisions of the laws of the state and to the United States only with the consent of the legislature of the state. The state has an absolute right to demand such a consideration as it may determine and to impose such conditions as it may see fit, with which the grantee must comply.

It is true that by Section 21 of the Federal Water Power Act, the right of condemnation is given to a licensee. As against an individual owner of such lands, this provision would probably be effective, if the lands were required for the purpose of improving the navigation of a navigable stream for the benefit of interstate or foreign commerce. As to the power of Congress to authorize an in-

dividual or a corporation to make use of the power of eminent domain, and by the exercise of that power to take private property, not for a public use but for the promotion of a private, as distinguished from a governmental enterprise, there is a good deal of doubt. That question has been raised in a litigation which I think is still pending in this state.

It may be that the state has the power to take private property regarded at the time of its appropriation as necessary for public use, and having taken it in good faith, has the right to retain it, although no longer required for such public use.

It does not follow that the federal government has the same right. The general government has only recently applied to the legislature of the state for its consent to the acquisition by the federal government of lands which were regarded as necessary for the war purposes of the government.

By Chapter 1 of the laws of the state of New York, of 1918, the Commissioners of the Land Office were authorized to grant to the United States lands which the government required upon which to construct a plant for the manufacture of munitions.

Again by Chapter 588 of the laws of 1918, power was conferred upon the Canal Board of the state to acquire lands by condemnation which were regarded as necessary for "the straightening and widening and improvement of Coney Island Creek into a ship canal between Sheepshead Bay and Gravesend Bay,' 'a public work in which the federal government was engaged.

It was understood to be necessary and doubtless was necessary to enact those statutes in order to obtain for the federal government the title to the lands which the government required for *Public use*. If it be true that such legislation was necessary, upon what theory can Congress assume to clothe an individual or a private corporation with power to take lands under water belonging to the state and compel the state to litigate the value of such lands in federal court?

Whatever the law on the subject may be, let no one deceive himself. Let no one suppose that the people of the state of New York are likely to sit quietly by while some licensee of a federal commission calmly appropriates to himself or to itself the greatest and most valuable asset in New York State, the common property of all of the people of the state, without protest or objection.

The State of New York may be depended upon to resist in the courts with all the resources at its command, and to yield up its property only after a judicial determination of the question involved.

MORRIS, PLANTE & SAXE,

Attorneys for New York Board of Trade and Transportation.

MERTON E. LEWIS,
Of Counsel.

Report of Committee of The Merchants' Association of New York on the St. Lawrence Ship Canal Project and action of the Association thereon.

The report of the Committee in opposition to the construction of the St. Lawrence ship canal, as approved by the Directors, was as follows:

"In 1909, by treaty between the United States and Great Britain, an International Joint High Commission was created to consider various matters relating to the boundary waters between the two countries, with a view to their adjustment by international agreement.

"Among the matters devolved upon that Commission was the duty of investigating what further improvement of the St. Lawrence River between Montreal and Lake Ontario is necessary to make the same navigable for ocean-going vessels and the estimated cost thereof.

Agitation in the West

"Although the International Commission has as yet made no report, the project is being vigorously advocated by the Great Lakes-Tidewater Association, which claims to represent the interests and the demands of fourteen Middle and Northwestern States, and which has the support of numerous business organizations in that territory. It further has the support of a number of the officials of those States, including some of the Governors and United States Senators.

"The project is now under consideration, with a view to promoting its adoption by Congress.

Hope to Become Ocean Ports

"The efforts of the association named are seemingly directed toward creating a widespread belief that a St. Lawrence Ship Canal directly connecting the Great Lakes and the Atlantic would be a great National benefit to the United States; and to so organizing and directing the public sentiment thus created as to induce Congress to commit the United States to assuming part of the cost of constructing a canal in Canadian territory.

"The project appears to be based upon the assumption that the present cost of transporting grain from the Central and Northwestern States to tidewater, will be lessened by making the St. Lawrence navigable, throughout its entire length, by ocean-going steamships having a draft of approximately thirty feet. It is contemplated that with such a waterway available, the upper Lake ports would become the Western termini of through ocean routes over which the export and import commerce of the West would move without breaking bulk.

"No definite estimates of capital costs have yet been made. That they will be enormous is obvious, as they must comprise not only the St. Lawrence improvement, but also the deepening of the channels of all the principal Lake ports from twenty-one feet to thirty feet.

"Omitting consideration of capital investment among the governing economic factors are the following:

I.

Excess Cost of Ocean-Going Tonnage

"Under pre-war and present conditions barges suitable for inland waters cost far less per ton than ocean-going freight steamships.

"*An ocean-going steamship requires a crew several times as numerous and more highly paid than is required by a fleet of canal barges having in the aggregate an equal capacity. The steamship's outlay for wages, subsistence, insurance and general overhead charges, is proportionately far greater than that of the barge fleet. Lake steamships likewise carry lesser crews than are required by ocean steamships.*

II.

Loss from Slow Movement

"In canals or canalized rivers, large deep draft steamships can seldom safely exceed an average speed of four miles per hour. If the canalized route be long, this seriously limits the earning power of the ship, enhances the risk, and increases the insurance costs. In the case of the St. Lawrence route, the aggregate loss of time and increased cost from this cause during a season would become a very heavy added financial burden on the traffic.

III

Limited Season of Navigation

"Among the natural obstacles to the proposed project is the relatively short season of navigation on the upper St. Lawrence, the Great Lakes and the connecting waterways.

"*Experience shows that as a rule navigation on the upper lakes ceases before December 1st, sometimes in November, and it is rarely practicable to resume it before sometime in April. The average season of navigation on the upper St. Lawrence and on the Lakes will not exceed say five to six months annually.*

"*Giving due weight to this fact, if the project be carried out, we would have an investment of hundreds of millions of dollars lying idle for approximately half of each year. This is a condition that cannot be overcome by man and entails an annual loss so huge that it becomes a very vital factor in the case under consideration.*

"In view of the physical condition of the ice in the St. Lawrence and in the Great Lakes, with a closed season of five or six months, the proposition becomes economically and financially unsound.

IV

Lack of Return Cargoes

"To be operated profitably ships must have cargoes both ways. There are many reasons, other and more controling than freight rates, why most imports tend to concentrate upon a few important coast points, and refuse to move through other ports where they would have the benefit of longer water carriage.

"It may be assumed as to the proposed St. Lawrence Canal

(a) That ships will not use it unless they can obtain profitable rates,

(b) That traffic will not move by it unless the rates are at least as low as by other routes.

"The ship-owner therefore must obtain a rate which will include

Interest and maintenance charges upon a high investment per ton, as against the similar charges upon a much lower investment per ton in barges,

Wages and maintenance of a crew about twice as large as that required for equivalent service in barge operation,

Time lost in slow movement which time might be profitably employed on other routes not subject to such delays.

"It is obvious that these items would impose upon ships using the proposed route a heavy burden of cost from which barges using a canal would be exempt.

"Barge movement, however, is subjected to the cost of transferring cargoes, from which cost ship movement is free.

Barge Canal Preferable

"Careful studies of the relative advantages and disadvantages of barge and ship canals were made by the Federal authorities from 1898 to 1900, and the advantage appears to be clearly in favor of barge canals; as a connecting link between the Great Lakes and sea ports. No conditions have developed to warrant the belief that the proposed new St. Lawrence canal and its connections will admit of cheaper water freights between the West

and Europe than are provided by existing waterways.

"There are three kinds of waterways along the proposed route, each involving the use of a different type of vessel—the lakes, canals, and canalized rivers, and the ocean. Is it possible to concentrate in one type the highest efficiency, greatest cargo capacity and lowest operating cost—a single type that shall meet the conditions of all three? This is not practicable, hence traffic moving through the Great Lakes and connecting canals in deep sea vessels would of necessity require greater rates than those charged by the more suitable and more cheaply operated Lake and Canal carriers.

Cost Would Be Increased

"We believe that under the conditions enumerated, the cost of traffic movement via the proposed St. Lawrence Ship Canal would be materially greater instead of less than the present cost. It would therefore be of no benefit whatever to the grain producing States, as traffic would not move by it. It would therefore be a financial failure.

"We can find no justification for an enormous investment by the United States in a project located in large part within the territory of a foreign State; which project is extremely dubious from a financial standpoint and offers no reasonable prospect of being an economic benefit to this country.

"Behind this proposition are the interests of Canada for access to an increased hinterland, and of the Middle West for increased transportation facilities.

Should First Look at Home

"While the physical conditions adjoining the boundary line between Canada and the United States are identical, the economic conditions are as different as the bases of the two governments are fundamentally different. Political and financial control vary in each country. Recognizing as we do the comity of joint action between the two nations in this matter, so far as that is practicable, nevertheless the United States must, as Canada itself is doing, conserve its own industrial development. It follows, then, that in the determination of this problem it must first consider the possibilities within its own confines before embarking upon outside developments.

"Disregarding for the moment the enormous obstacles imposed by nature to this scheme, there are administrative features that must be considered. For example: Suppose that Great Britain and her Dominions are at war with Germany and Russia and we are not. Formerly when wars were waged largely by professional armies there was not much strictly contraband of war. Our experience of the past four years has shown that now almost everything is contraband of war when war is waged by populations. Suppose that we seek to send grain or iron in any form to the nation with which Great Britain is at war. Is it likely for a moment that Canada would suffer us to move grain or metal through that portion of the proposed waterway which lies wholly within Canadian territory? The answer must be clearly, No. On the other hand, suppose that we are at war

with an Asiatic nation, whereas Great Britain still maintained peaceful relations with it. Again, is it likely that Canada would suffer us to move any sort of contraband material or bodies of men through that portion of the proposed waterway lying wholly within Canadian territory? Again the answer is obviously, No.

Project Should Be Opposed

"In view of the foregoing considerations we recommend that The Merchants' Association of New York oppose the project; and that it concur in the following preambles and resolutions adopted March 25, 1920, at a conference of the New York Delegates to the Fifteenth Convention of the National Rivers and Harbors Congress, held at Washington, December 9-11, 1919:"

The Association unanimously adopted preambles and a resolution, in conformity with the foregoing report, condemning the project.

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TITLE